Forest History Association of BC (FHABC)

Publishers Note: (June 2022)

FHABC is pleased to publish the book which appears below.

This personal memoir of John Dick covers many topics far beyond the scope of Forest History, but the sections covering forestry and environmental topic make it of interest to the Forest History community.

A Personal Critique of World Forestry And Environmental Resource Management

By John Howard Dick

An extract of the book (the section on Laos) appears in an FHABC **Newsletter Issue in 2022**.

Publishing this book continues the FHABC International series that began in Issue #103, September 2019.

We congratulate and thank John Howard Dick for making this material available to our members and visitors to our website.

Newsletter Committee
http://www.fhabc.org
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A biography of John Howard Dick

John Dick is a Canadian citizen who grew up in Alberta and attended the University Of British Columbia in 1959, initially studying Forestry, but completing his degree in 1964 in Biology. From 1964 to 1969 he worked for the Tanzanian Forestry Department in East Africa, first as a District Forest Officer as a Canadian University Service Overseas (CUSO) volunteer and then as a Silvicultural Research Officer with the Canadian Government aide program CIDA. He completed his contract in Tanzania in 1969 and on his way back to Canada obtained a diploma in forest research and biometrics from the Commonwealth Forestry Institute, University of Oxford, U.K. He returned to Canada to do an MSc in Forestry at UBC from 1969 to 1971. For personal reasons he was unable to complete the MSc while in residence at UBC but he subsequently submitted a thesis in 1978 entitled "A Management Plan For The Rehabilitation of Surface Mined Coal Lands in the East Kootenay, B.C." based on his subsequent experience in the mining industry and as a provincial Mines Inspector (see below).

In 1971, he joined an international mining company in BC as ecosystem reclamation and environmental control supervisor on its open-pit coal operation in the East Kootenay, B.C. He left private industry for the BC Government in 1974 and over the next 8 years worked in various technical capacities - as environmental mines inspector, wildlife habitat management specialist, natural resource planner and environmental impact assessment specialist. In 1981 he joined the newly-formed Ministry of Environment as director of a unit leading regional-level integrated strategic environmental planning and coordinating government inputs to environmental impact assessments on major development

projects. In 1990 John and his wife Lynn (also an environmental professional) were seconded from the Provincial ministry to work on a Canadian aide project providing environmental management technical assistance to the Indonesian Government's environment agencies. They returned to Canada in late 1993, and in 1994 John opted for early retirement from the Provincial Government.

Since that time he has worked primarily for multi-lateral aide agencies (World Bank, Asian Development Bank, Inter-American Development Bank, United Nations Development Program) as an environmental management and environmental impact assessment specialist. He has worked primarily on capacity building in government environmental management agencies, on the environmental aspects of large, government-sponsored mining and forestry projects, and most recently on projects involving community involvement in natural forest management and on reducing carbon emissions from forest degradation/deforestation. Over the past two decades he has worked on mining projects and issues (India, Indonesia, Cuba, Cambodia, Panama and South and Central America), natural forest management projects (Indonesia, Bhutan, Cambodia, Laos, Mongolia and Guyana), industrial plantation projects (China, Indonesia and Vietnam) and carbon storage/sequestration programs associated with forest protection and management through the UN-REDD+ program (Laos, Vietnam, Cambodia, Belize, Pakistan and Bhutan). One of his major interests and concerns has been the impact of development projects on indigenous peoples and the ecological resources that sustain them.

John has taught several courses at the University of Victoria, British Columbia:

- Biodiversity Conservation, and Environmental Impact Assessment in the School of Environmental Studies; and
- Mine-site Reclamation, Ecosystem Approaches to the Management of Non-wood Forest Products, and the Selection and Propagation of Native Plants for Ecosystem Restoration in the Restoration of Natural Systems (RNS) Program, School of Continuing Education.

Over the past 13 years he has been a volunteer in the Federal/Provincial/Local Government-supported Garry Oak Ecosystem Restoration Program through the Native Plant Propagation Sub-Committee and the Fire and Stand Dynamics Sub-Committee.

A Personal Critique of World Forestry
And Environmental Resource Management Practices

By John Howard Dick

PREFACE

This document will contain what some might consider a random mixture of natural, institutional, human and personal (not that I'm not human) reflections. I have never disconnected these. I believe that they're intrinsically linked. Humans have modified natural systems to suit their purposes (often not wisely). On the other hand, natural environments have set the ultimate limits on the levels and types of human development and use that are sustainable over the long term without significant environmental degradation, biodiversity loss, and social dislocation.

We will need, going forward, a much wiser balance of human expectations and behaviors, and a deeper understanding of the limits that natural systems – atmospheric, terrestrial and aquatic - impose on those expectations and influence our own personal choices. And governments will need to develop wise and enforceable policies and legal/socio-economic instruments to guide us and ensure we're proceeding in positive directions. In the words of British author E.F. Shumacher*:

"Ecology holds that an environmental setting developed over millions of years must be considered to have some merit. Anything so complicated as a planet inhabited by a million and a half species of plants and animals, all of them living together in a more or less balanced equilibrium in which they constantly use and re-use the same molecules of soil, air and water, **cannot be improved by aimless and uninformed tinkering"**.

All changes to a complex system involve somie risk and should be undertaken only after careful analysis. When information or experience are incomplete, changes should stay close to the natural processes, which have in their favour the indisputable evidence of having supported life for a very long time. If we don't get there, I truly believe only bad things will happen.

*E.F. Schumacher 1973 "Small is Beautiful: Economics as if People

April 2022

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CASE STUDIES

Many of you will know that I have very strong opinions on many issues and am prone to occasional "rants". So I'll forewarn you that I've not been able to resist commenting on several areas - some controversial - of particular historical, political, social and environmental interest to me. These are distinguished as "Case Studies" and are located near the end of the relevant chapters, so you can skip over them if you wish.

CHAPTER 1. MY EARLY YEARS

I grew up in Alberta in the 1940s and 50s, which was a time of great freedom for kids. I had grandparents who I visited regularly in both Banff and Medicine Hat, and relatives in the East Kootenay. My playground from youth to late teens was thus the short-grass and tall-grass prairies, the eastern foothills, the sub-alpine and alpine environments of the Rocky Mountains, and the dry forests of the southern Rocky Mountain Trench. I can't remember a time when I wasn't infatuated with natural ecology and didn't want to be a forester. I also had the great experience of spending several summers on a family friend's mixed-farm near Huxley in east-central Alberta, riding horses, tending livestock, and helping out at harvest-time as I grew bigger and stronger (stooking oat sheaves in the hot summer sun was a brutal job). I belonged to a very active Boy Scout Troup in Calgary and we regularly volunteered on conservation projects with the Eastern Rockies Forest Conservation Board.

My best subjects in both Junior and Senior High were Biology, History/Social Studies, and English. I absolutely sucked at Chemistry, enjoyed Physics, and split Mathematics – great at Trigonometry and sucked at Algebra. I hated memorization, and if I couldn't find the logic to a subject I was sunk. I graduated from high school in the spring of 1958 and had applied late the previous year to enter UBC in Forestry in the fall. However, UBC decided my math didn't quite meet B.C. matriculation standards and I would be required to up-grade.

I went to Mount Royal College in the fall to get the required math up-grade and the next year got a job working for the Calgary Parks Department under a small, wiry Scotsman who had fought through WW2 in North Africa and Italy in the famed Highland Light Infantry. He was a horticulturist by training and he gave me a really good introduction to the science.

CHAPTER 2. UNIVERSITY UNDERGRADUATE YEARS AND SUMMER JOBS: 1959 to 1964

In the fall of 1959 I left Calgary for Vancouver to start Forestry at UBC. The first year it seemed to me that the curriculum could be summed up by two **Forestry Mantras: #1** "It is our duty as responsible resource managers to replace decadent, inefficient old-growth forests with 'thrifty', fast-growing new forest stands" and **#2** "Clear-cutting mimics (replicates) the effect of wildfire in the management of natural forests".

My first point of disillusionment came in my first summer job in 1960, working for Rayonier Forestry Inc. (HQ now in Florida) doing forest regeneration "cruising" of old 1940's A-frame clear-cuts on Moresby Island in the Queen Charlotte Islands (now Haida Gwaii). These had produced high-quality Sitka spruce logs to be made into plywood for De Havilland Mosquito Fighter Bombers in WW2. The logging areas hugged the shoreline, seldom reaching more than 800 m upslope. Logs were winched downhill by choker cables (sort of like a heavy metal lasso) to a large raft that housed the "A-frame" tower and Donkey engine. The logs were assembled in the water into rafts and these were towed by tugboat to plywood mills as far away as the lower mainland.

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My partner, John Mansell, and I spent four and a half months that summer under canvas and had dry weather for only two weeks in August. We were hired by Rayonier's head office in Vancouver, provisioned out of the Company's main logging facility Moresby Camp at the head of Cumshewa Inlet. The Moresby administration didn't really "want to know us" because they knew we wouldn't have good things to tell them, but we were given a 15 ft. open wooden boat and a tent, and were tasked with surveying Sitka spruce regeneration on all of the A-frame logged areas from Cumshewa Inlet to Lyell Island, a direct north-south distance of about 45 kilometers and about four-five times that distance along the coastline. We moved camp about every 7 to 10 days and each time went back to Moresby Camp for provisions, largely tinned goods (or "bads" actually – Spam, corned beef and canned peas). We were, however, able to regularly supplement our company provisions with wild berries, and fresh salmon that we could catch on our way back to camp from the day's work.

Our normal workday started with a boat trip to the point where our previous day's survey finished. We secured the boat on the beach and began our new day's survey by walking in opposite directions along the beach to locate our respective start-points. In those "ancient" days the unit of measure in forestry was the "chain", which was 66 ft. (go figure). To carry out the survey you cut yourself a staff 6.6 ft. long or 1/10th of a chain. You then proceeded to walk straight uphill on a compass bearing at a right angle to the beach towards the upper edge of the clear-cut, using your staff to gauge distance, and stopping every chain to survey a sample area consisting of four, $1/10^{th}$ chain by $1/10^{th}$ chain quadrants. You then counted all of the coniferous regeneration on each quadrant. You proceeded in this manner until you reached the edge of the clear-cut and then tried to "offset" 10 chains cross-slope along 2the edge of the clear-cut, traversing deeply-incised stream courses to establish your next survey line, this time going back downhill to the beach.

This was probably the hardest job I've ever done. Most of the cut-over area was a dense "sea" of salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus spectabilis*), salal (*Gautheria shallon*) and Devil's Club (*Oplopanax horridus)* (the latter so named because it has numerous "horridly" diabolical spines that are mildly poisonous) on very steep, wet slopes, still unstable from the original logging - murderous terrain to try to move in. Many times I can remember crawling on my hands and knees for a couple of hundred meters pushing my measuring staff ahead of me on the ground because it was the only way to make any progress at all in the thick vegetation. Falls were very common because of the steep, unstable ground, rotten logs and not being able to see where to place your feet. At one point I recall coming down a particularly steep and slippery slope and being confronted by a huge thicket of Devil's Club. I paused to try to pick a good route down but the ground suddenly gave away under my feet and I somersaulted down the hill, straight through the Devil's Club thicket. When I picked myself up and examined myself I couldn't find a single spine anywhere in my body. I was convinced that if I'd tried to negotiate the thicket slowly and carefully, I'd have been picking festering spines out of my carcass for days.

The worst part of all this was you were by yourself all day, and you knew if you didn't show up at the beach at the end of the day the only way your partner could come to your rescue

would be to try to follow your survey lines – an iffy prospect at best. This whole job would probably not come close to meeting today's worker-safety standards.

Our survey found that less than 5% of the logged area had ANY recordable coniferous regeneration 20 years after logging, and most of that was limited to Western red cedar, heavily browsed by Sitka deer - so much for **Forestry Mantra #2**. The Company was not much pleased with the results because of the obvious, serious implications for reforestation responsibilities. In the grand tradition of "killing the messengers" we weren't invited back for the next summer.

In late July my partner got sick and had to be air-lifted to hospital in Prince Rupert, so for about two weeks I volunteered to set chokers on a clear-cut "high-lead" setting that was logging huge, old-growth Sitka spruce. One lunch time I climbed on top of a big 8+foot diameter, newly cut stump and for lack of anything better to do I began counting "annual rings". I got to about 875 before the rings got too close to count, but what I did notice was five "pitch-pockets" that could only have been fire scars. So this old tree had survived a fire about every 150+ years (and almost certainly less severe ground fires on a more regular return) that was hot enough to lightly scorch some bark and clean out the undergrowth, but the effect of all this was just a little different than the devastated clear-cut I was sitting in and the historical areas we were surveying – so much for **Forestry Mantra # 1.**

In my second university term I decided (for reasons I still can't explain) that I wanted to be a forest entomologist. I guess one reason was that the entomology course that year, taught by Dr. Ken Graham, was excellent and I pulled down the best result of my undergraduate years - a 95%. With Dr. Graham's recommendation, I applied to the Federal Government for a job in the summer of 1961 in forest entomology working out of the Burnside Forest Research Centre in Victoria.

You may imagine my surprise that the job offered to me was in veterinary/medical entomology working as a technician at the agricultural research centre in Lethbridge, Alberta, working on biting flies (mosquitoes and horse, deer and snipe flies) and parasitic insects (bot and warble flies). It was an interesting, if somewhat grizzly, summer and I learned things that I really didn't want to know, such as the following:

- Warble flies (*Hyoderma* spp.) (aka "gadflies" because they are large, very active and disturbing, and cause livestock [cattle and deer] to "gad-about"), lay eggs on the animal's hairs. The eggs have small pincers on one end that allow them to attach to the hairs. The larvae hatch and burrow into the animal's body, migrating to connective tissues and the esophagus. After a few months the larvae migrate back to the skin surface, commonly along the animal's back, where they pupate. On emergence, the newly hatched flies leave holes/scars in the skin that can seriously reduce the value of the hides. In humans and horses the larvae seem to lose their sense of direction on migration to pupate, and can end up in eye sockets or the brain. At the time I worked in this program it was estimated that up to 10% of suspected brain tumors in children in farming/ranching communities in the Great Plains region of Canada/US might

- actually have been "disoriented" warble fly pupae. The spookiest part of all this was that the scientist studying warbles (Dr. Gerry Weintraub), in order to get specimens for study, would carefully take a female fly in forceps and induce it to lay eggs on the hairs of his forearm. He would then take a straight razor and shave the hairs and eggs into a petri dish. He was, understandably, a little paranoid about making sure he got ALL the eggs and then thoroughly scrubbing the area with alcohol.

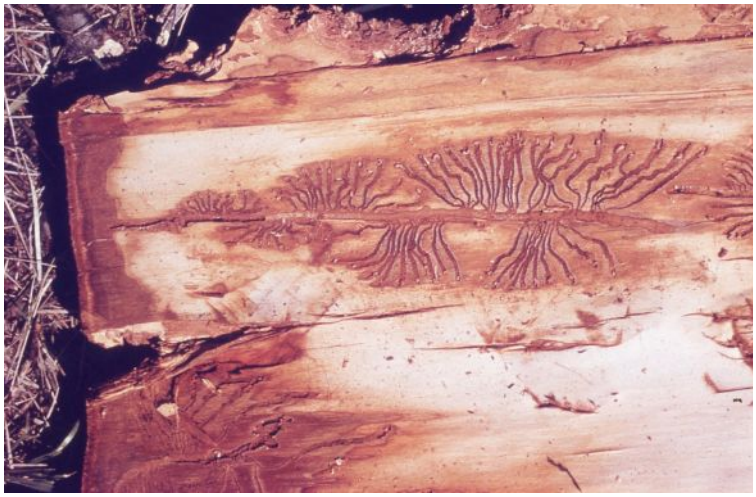
- Bot flies (*Ostridae* spp.) deposit eggs on the host (horses and cattle) either themselves or by co-opting an intermediate vector (common houseflies or mosquitoes) on which they attach their eggs to be subsequently deposited on the hosts. Hatching is usually stimulated by the animal licking itself, which introduces the larvae to the animal's digestive system. Once inside the animal the larvae attach themselves to the lining of stomach or intestine where they feed off the passing semi-digested food until eventually passing out in the animal's faeces to pupate on the ground. Heavy infestations can seriously affect animal health and growth.

Culex mosquitoes are one of the most common vectors of human diseases (West Nile, Japanese encephalitis, and perhaps now Zika). Southern Alberta agriculture was beginning to be heavily irrigated in the 1960's and the result was a major mosquito infestation that included the first reporting of *Culex* species in Alberta. To study mosquitoes, the lab established a large "vacuum cleaner" in an irrigated alfalfa field. Insects were sucked into a vertical cylinder and every hour a disc dropped down into the cylinder thus segregating the "catch" in time. My job every morning was to retrieve the cylinder, place it in a freezer for an hour to kill the bugs and then spend about two hours with a microscope identifying the "catch" by species. The mosquito lab had large gauze cages to raise insects for study. The cages contained water so the females could lay eggs, alfalfa plants for the males to feed on (they're vegetarians), and the females were fed by gauze pads soaked in cow's blood and laid on the cage netting (they cannot produce viable eggs without a feed of mammalian blood). Early on my supervisor asked if I would like to try to breed *Culex*. He explained that it was the one species that showed no interest in the gauze pads and thus there'd been no success in getting viable eggs. I said I'd give it a try and set up a "colony" with males and females I collected from the field. I started with other types of blood (pig, sheep, goat) without result. Finally, in desperation I made a sacrifice in the name of science (in the footsteps of Dr. Weintraub) and stuck my arm into the cage for half an hour. Within a week I had my first eggs, which hatched into larvae. Seems like the little beasts preferred my warm body to a bloody piece of fabric (good taste obviously). I would have liked to experiment with lab rats and bunnies but I ran out of time and had to return to University.

The next year the Federal Government employment agency got it right, and I spent the next three summers (1962-64) working as an entomology technician for the Canadian Forestry Service based in Victoria and working out of Lac la Hache in the Chilcotin on Douglas-fir bark beetles (*Dendroctonus pseudotsugae*).

Counting bark beetle weevils with boss Les McMullen in Lac la Hache BC

At one point I had the great privilege of working with Dr. John Chapman, at that time one of North America's pre-eminent forest entomologists (and the father of Dr. Nancy Turner, U.Vic.'s wonderful ethno-botany professor). John predicted our current mountain pine beetle (*Dendroctonus ponderosae*) epidemic in 1962, and said it would dwarf any insect infestation we had yet known. He also said that it would be anything but a "natural disaster" but rather due entirely to ecological ignorance in forest management decisions. The main tree species in central B.C. is lodgepole pine (*Pinus contorta*) - a short-lived species after fire that begins to lose vigour after about 70 years, after which it either burns or is attacked by the mountain pine beetle. The proper management regime would have been to allow some controlled fires to burn and/or to clearcut in patches to create a mosaic of stands of different ages across the landscape, which would limit the scope and spread of both wildfires and beetle infestations. Instead provincial forest managers elected to put lodgepole pine "on the shelf" while they focused on the remaining, more valuable Douglas-fir and white spruce stands in the Central Interior. By the early-1990s an essentially even-aged (+/- 15 years), decadent pine monoculture, long past its "best by date", had developed from the Coast Range to the Rocky Mountains – "a bark beetle deli". This was followed by a decade of abnormally hot summers (which stressed the trees and made them more susceptible to attack) and abnormally mild winters (that didn't limit bark beetle larvae survival). Over the ensuing 20+ years, a rapidly expanding pine beetle infestation has killed over 20 million hectares of lodgepole pine in the central interior and spread over the Rocky Mountains into Alberta and across the border into the U.S.



Piece of bark showing Douglas fir bark beetle burrows

So, in short, the Mountain Pine Beetle epidemic was not the result of an "act of God" but was rather the direct consequence of a major silvicultural blunder.

By my third year of forestry I was in open revolt with the Faculty. I requested the opportunity to take some systems-ecology courses in the Biology Faculty (at this time a student went through four years in the Forest Management Option, and graduated with a Bachelor of Science in Forestry without taking a single credible ecology course), but was denied. I completed third year and then applied to change faculties to Biology. When the Dean of Forestry called me to his office and asked my reasons, I replied that I felt I was getting an

education in how to cut trees, not how to manage forests - which pretty much sealed the divorce. So I finished my undergraduate career in 1964 with a B.Sc. in Biology, taking courses in entomology (Geoff Scudder), general zoology (the incomparable Ian McTaggart-Cowan), genetics (the rather arrogant and very young David Suzuki), plant taxonomy (Catherine Beamish), plant physiology (Dr. Wort ?) and systems ecology (Roy Taylor). The switch did mean that I had to spend a fifth year in undergraduate studies but in retrospect it was well worth it.

CHAPTER 3. MARRIAGE, CUSO AND TANZANIA: 1964 to 1966

In the fall of 1963 at UBC, I had applied for a Canadian University Service Overseas (CUSO) for an international posting, citing Tanzania as my country of choice and forestry as my desired field. I can't remember a time when I didn't have a passionate desire to travel and work in the developing world and my greatest interest was in East Africa – Tanzania in particular, because of its wonderful savanna and montane landscapes, its spectacular wildlife, and its inspiring President, Julius Nyerere. I had an interview in January and the result was that I got both choices. (A little aside here. I phoned home to give my parents the news and got my father. He was very happy for me. He then handed the phone to my mother, who had obviously understood the conversation because her first words were "I just feel sick to my stomach" - elation to deflation in an instant. I'm sure that my dad would have loved to visit us in Africa - Mary's parents did - but he couldn't possibly have come without my mother).

At Christmas 1965 I joined friends from the UBC Varsity Outdoors Club on a ski trip into Kokanee Provincial Park in the West Kootenay. On this trip I met Mary Kaffka who was from West Vancouver. She and I began dating shortly after our return to Vancouver and we became engaged in the late spring. After our engagement, Mary also applied to CUSO and was accepted for a secondary school assignment teaching English. After graduation I again worked the summer for the Canadian Forestry Service in Lac la Hache. Mary and I were married in early August, and in mid-August we started our adventure.

There were about 45 of us bound for Africa – several newly married couples and many singles – a great and interesting group; we had much fun at orientation. At the end of August we boarded a Royal Canadian Air Force Bristol Britannia airliner (in those days aircraft on international flights still had those funny spinner things called propellers) and set out on our marathon journey – Montreal, London, the SHAFE (NATO) military base south of Paris, and then to our "promised land" - AFRICA. Our group of volunteers were destined for West, East and Central Africa and so, for the next 10 days, our contingent hopped across the continent on an exhausting "magical mystery tour" dropping people as we went – Accra, Lagos, Kampala, Nairobi, Dar es Salaam (where we got off) and finally Lusaka. One of my fondest memories of the trip was our first night, in Accra, where we were billeted in an empty university dormitory with, an apparently very strict, male/female segregation policy. So all of us newly-weds were separated and sent off to segregated dormitories. What with new sounds (geckoes, cicadas, tree frogs, etc.), bats, and REALLY big spiders it took the newlywed wives about a nano-second to locate their respective spouses and resume protective co-habitation.

The Tanzanian group landed in Dar es Salaam in the second week of September. We were briefed by CUSO and Canadian Embassy staff and then sent to our respective Ministries to learn about our assignments – me to the Forest Department and Mary to the Ministry of Education. We were told that we were going to Tabora in western Tanzania – Mary to teach English at the Kazima Girls Secondary Boarding School and me to be the District Forest Officer in the "Western Timber Circle", working initially under a Regional Forest Officer (a long-term British expat). He was due to go on home-leave before Christmas, after which I would assume his technical duties. Since I was not an "official" public servant and could not take financial and administrative responsibility, "someone" would be found to sign-off on the respective reports (which in any case I would be required to prepare) "when the time came". A day and a half after landing in Dar es Salaam we were on our way via East African Railways on the 21/2-day trip to Tabora. As the train departed, I was told later by one of the senior Department staff, that the British Assistant Chief Conservator, who had come to see us off said, under his breath, "Good luck to that poor sod!"

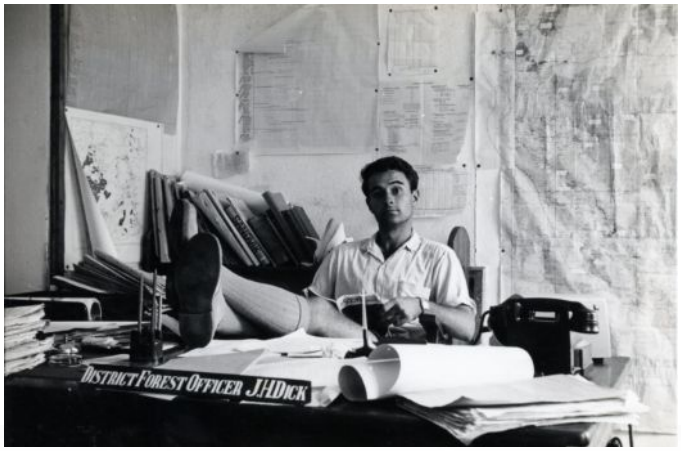
CHAPTER 4. FOREST MANAGEMENT IN TANZANIA: 1964 to 1966

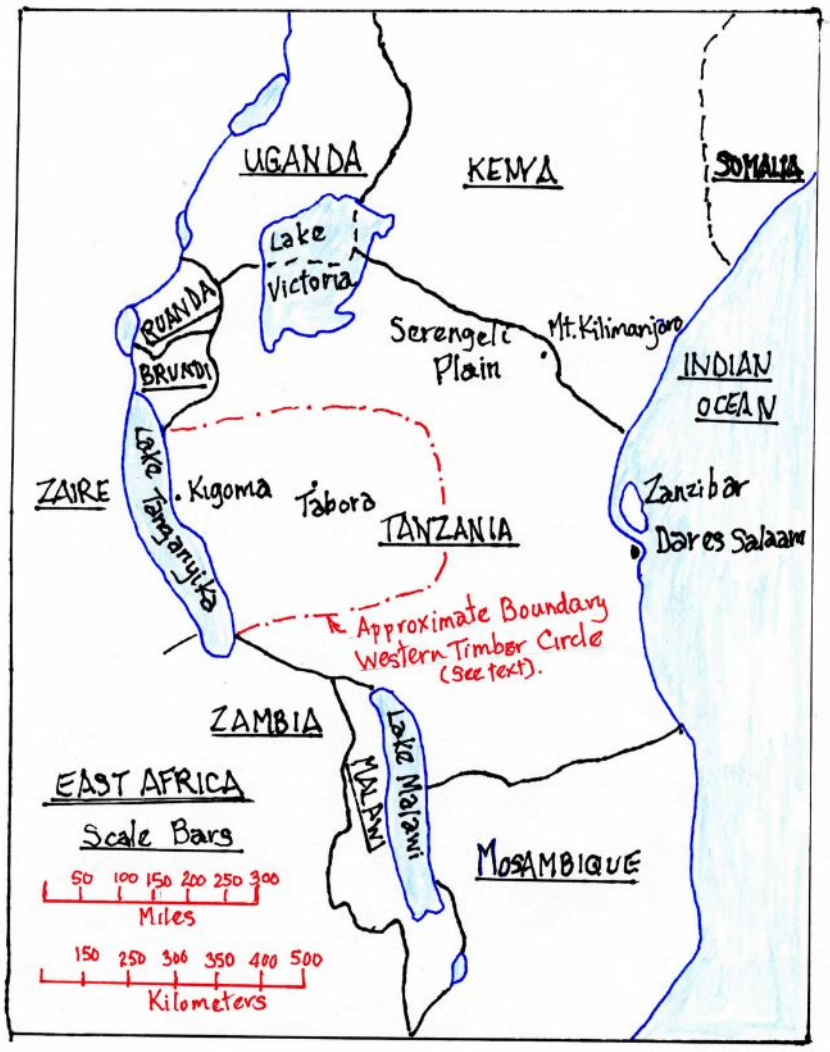
Forest management in Tanzania in the early 1960s was in a critical state. Though there were 29 established professional forest officer positions in the Department, only 17 were filled – 13 British expats, many of whom were nearing retirement, and four Tanzanians recently returned from foreign universities. The gap was to be partially filled over the short-term by CUSO, VSO and Peace Corps volunteers, and foreign aid workers mainly from Czechoslovakia. At the time most of the foreign aid funding for forestry was being channeled towards the establishment of exotic pine plantations in the northern highlands (Arusha/Moshi), the Usambara Mountains and the southern highlands around Mbeya, to alleviate a FAO-predicted major wood and pulp shortage expected in the mid-1990s. These plantations were established by the clear-felling of magnificent, species-rich, East African montane rain forests consisting of the conifers East African pencil cedar (*Juniperus procera*) and plumb pine (*Podocarpus latifolius*), and hardwoods such as camphorwood (*Ocotea usambarensis*), East African Olive (*Olea capensis*), Verbena (*Vitex kiniesensis*) and pillarwood (*Cassiporea malosana*). This ecological travesty reflects the attitudes of much of the forestry profession at the time (see Forestry Mantra #1) and even FAO today (see Bhutan World Bank project, Chapter 17). Most of the available "experienced" British expat forest officers were assigned to these projects, and people like me were sent to natural forest areas, which was exactly where I wanted to be.

My future was the "Western Timber Circle"– 80,000 square miles of stunning savanna woodlands and montane forest reserves (both production and protection) - which I fell in instant love with (but were described by one disenchanted Brit as "miles and miles of BLOODY Africa") - in three administrative sub-regions and nine administrative districts (which I'm sure have changed over the years) as follows, from east to west:

- Singida Sub-region (Nzega, Manyoni, and Singida districts);
- Tabora Sub-region (Tabora, Mpanda and Simbawanga districts); and
- Kigoma Sub-region (Kibondo, Kasulu, and Kigoma districts).

King of the Western
Timber Circle, Tanzania





Before independence in 1961, the "Timber Circle" had a senior regional forest officer and three sub-regional forest officers (all ex-pat and university-trained), three foresters (3- 5 years of technical training at the forest department's educational centre), 13 forest rangers (1 year of technical training), and about 120 forest guards. At the time I arrived in Tabora, so many British expat foresters had left the service that the regional forest officer (an Englishman David May) was the only person above forest ranger grade.

Singida Sub-region contained very dry savanna woodland and shrubland ecosystems and had minimal commercial forestry values but high wildlife and domestic grazing values. Tabora Sub-Region contained rich, moist "miombo" open savanna woodland ecosystems, and thus was the main centre of commercial forestry operations but also had high biodiversity and wildlife values. Kigoma Sub-region contained the only semi-evergreen rainforests in western Tanzania (along the Lake Tanganyika rift escarpment) and rich montane, volcanic, sub-tropical moist grassland/savannas (in the Kasulu/Kibondo Highlands).

Annual fires in Tabora

"Miles and miles of bloody Africa"

Highlands

All of the forests in the region, except the semi-evergreen montane rain forests, were subject historically to annual anthropogenic fires that maintained the open woodland structure and prevented a build-up of fuels that would cause serious ecological damage.

Sometime in the 1930's a British forest officer decided to find out what would happen to the dry savannas of Manyoni District if fire were excluded. He delineated a square mile of forest surrounded by a double-line fire barrier that was annually cleared of all vegetation and "back-burned". When I visited the area at the end of the rainy season in 1965 what I found was an impenetrable thicket of vegetation that only elephants could utilize. The annual cost of clearing the fire barrier was rapidly becoming unsustainable and the Head of the Silvicultural Research Section approved its abandonment. When I visited after the following dry season, the area had burned so severely that it would take years to recover.

Given these biophysical realities, my focus over the two years I spent in Tabora were:

- protection and management, including single-tree selection harvesting, of the miombo forests of the Tabora Region;
- protection of the Lake Tanganyika escarpment forests in Kigoma and northern Simbawanga Districts, which included the Gombe Stream Chimpanzee Reserve (I had the privilege of meeting Dr. Jane Goodall there); and
- soil conservation and the gradual introduction of exotic (the ubiquitous Eucalyptus) fuelwood plantations in the fragile, upland, volcanic landscapes of Kasulu/Kibondo to protect the escarpment forests from further-exploitation, stabilize many areas of serious erosion due to overgrazing, and provide more easily-accessible fuel wood for local villages (studies by local social NGOs had shown that simply collecting fuelwood for cooking was at that time taking women three hours or more a day).

Not surprisingly, because of its economic significance, the Tabora region occupied most of my time. The miombo woodlands contained many very valuable hardwood species in high demand in European furniture and specialty wood markets, the most notable of which were mninga (*Pterocarpus angolensis*), mtundu (*Brachystegia speciformis*) mbanga (*Afrormosia angolensis*), mbembakofi (*Afzelia quanzensis*), and mpingo or African ebony (*Dalbergia melanoxylon*). Priority management activities included: 1) completing the first comprehensive miombo forest inventory; 2) calculating sustainable allowable selection-harvest rates for each major species in collaboration with the forest management specialists in Dar es Salaam; 3) delineating, administering and controlling annual commercial felling coupes; 4) regular patrols to detect timber theft, forest encroachment and other illegal acts; 5) forest reserve mapping in cooperation with the Forest Surveyor in Dar es Salaam (Parker Williams, a 1965 CUSO volunteer and old VOC friend from UBC); 6) updating three of the eight 10-year forest reserve management plans; 7) regeneration studies on mninga and mtundu; and 8) working with the Department's Utilization Section to try to assess, and where possible improve, the technical capacity of the region's sawmills.

This latter task became for me one of the most enjoyable, educational and challenging parts of the job because I really knew nothing about sawmills. Happily, the Utilization Section's sawmill expert, Cyril Flamwell (a little Cockney Englishman), was nothing short of phenomenal – supremely competent and incredibly funny. The existing sawmillers were largely South Asian, British and, in one case a Canadian from Nanaimo, and after independence had faced considerable uncertainty over tenure and log supplies. Many were

trying to sell their mills and the regional government was eager (perhaps too eager) to take advantage. The problem was that in the decade leading to independence few of the operators, because of the political uncertainties, had invested in improvements or often even adequate maintenance. Our job was to ensure that the government didn't make bad choices. To give a flavor of the situation, I've included some excerpts from Cyril's reports (where he invariably referred to himself in the third person as Mr. Flamwell) at the end of this chapter.

Most of the forest management budget came in the form of annual grants of foreign aid funding from the Scandinavian countries. Competition for these funds was fierce. We were required to develop an annual work plan and budget at the beginning of every fiscal year, and then revisit the budget at the end of every quarter indicating expenditures to date, projected expenditures for the balance of the year, revenues collected, and either additional funding required (good luck!) or money that could be surrendered for use elsewhere. The Tabora region had a wonderfully competent administrative/accounting section and I was constantly amazed at how quickly financial and budget reports could be prepared – and all this in the days of manual records and calculations before computers.

One of the great pluses of the job was the opportunity, on almost every trip into the field, to see wildlife – zebra, giraffe, lions, leopards, springbok, Cape buffalo, kudu, eland, sable and roan antelope, hippos and elephants. While lions and leopards could make you pretty nervous when you were on foot (particularly walking "back to base" overnight after a vehicle break-down, as I had to do several times), elephants, Cape buffalo and hippos were nothing short of terrifying. Our forest inventory team had a 10-ton Bedford truck to transport staff and equipment. One day they were traveling on a forest road, came around a corner and there was a herd of elephants, with one large matriarch. She saw her herd "safely off", turned around, came thundering down the road and beat the hood of the truck down around the engine block with her trunk. Then, very proud of herself, she rejoined her friends. Hippos could be deadly and it was a rule in wetland areas to try (if possible?) never to get between hippos and water. In my days there, hippos, elephants and Cape buffalo were responsible for more human deaths in Tanzania than any other wild animals.

The roads less traveled

Just before Christmas 1964, the expat Regional Forest Officer David May, who had provided me with a wonderful "handing-over transition", left Tabora on home leave. I took over his technical forestry duties, and the Forest Department in Dar es Salaam appointed a senior Tanzanian forester (appropriately named "Benedict" as it turned out) to assume financial responsibilities. This arrangement lasted throughout 1965 and turned out to be really unsatisfactory. The Department provided no guidance on how the two of us were to work together and what our respective responsibilities should be. The person selected came to the region from a long period of administrative leave with a strong sense of grievance. He had been placed on medical disability for some time and was not in good mental or physical health and thus could not do any field work. He was arrogant with subordinate staff and treated our two Land Rovers as his personal vehicles. He had little understanding of the budgeting process and, furthermore, was away from the office on a regular basis without explanation and thus was often not available when his signature was required on outgoing documents. We got very adept at forgery, which he was never aware of or, perhaps more to the point, couldn't have cared less.

This unfortunate situation ended only when a new Tanzanian forestry graduate from the University of Montana, Lawrence Rutagumirwa, arrived to become the official Regional Forest Officer in December 1965. The following year was really enjoyable. Lawrence and I worked well together and I think he was grateful for the overlap and continuity – something

that didn't happen all that often. I mention this episode only because it taught me a useful lesson. Any job entails some degree of professional, institutional and/or personal ambiguity – sometimes more, sometimes less. One can either accept the ambiguity and work around it or allow it to ruin the experience. The experience I had as a volunteer in Tanzania was too valuable and special to allow it to be spoiled by circumstances that were outside of my control.

Excerpts From The Sawmill Inspection Reports Of Cyril Flamwell, Utilization Division

- This is the worst and most dangerous mill I have ever seen and a letter has been sent to the Regional Labor Officer advising its immediate closure.
- The prime mover is a Marshall steam engine built in 1912, bearing an inspection stamp for 1944 and possibly inspected since, which cannot deliver more than 15 h.p. This is supposed to power both the breakdown saw and the resaw but the two cannot be used together because of the lack of adequate power, indeed it was stated that the machine not-in-use could not even be allowed to run idle.
- When the sawyers, who were operating the re-saw, were asked by Mr. Flamwell to turn their attention to the breakdown saw, a most intriguing drill was set in motion. The sawyer closed down the steam engine and, at the sound of a whistle, hordes of men shot into a black underground recess to manhandle the drive belts. Division staff did not venture to accompany them but were able to follow progress by the muffled cries of encouragement or dismay that marked successive maneuvers.
- After some time the belts were adjusted and the sawyers re-emerged. To an uninstructed observer a roll-call would have seemed a desirable safety measure, but practice makes perfect, and the steam engine was restarted and a fearful chattering directed our attention to the -
- Breakdown saw: The components of the saw and carriage are so worn and loose as to be virtually useless. The power is quite insufficient and the bench was driven in a series of six-inch jerks, the saw and the steam engine being brought almost to a stop at the end of each jerk. The timber produced had a variation in thickness of up to 1 1/2 inches - a nominal 2 1/2 inch plank varied between 2 3/8 and 3 3/8 inches.
- Crosscut saw: The pendulum crosscut was a contrivance even more diabolical than the power transmission. The balance weight was far too small so that the operator, instead of pulling the saw towards himself to cut a plank, had to hold it back to keep himself from being disemboweled.
- The mill was originally electrically operated, but power was replaced by a 65 h.p. diesel engine, but the new mill manager placed this engine so that the saw could only run backwards. This problem was resolved by the novel solution of crossing the V-belts, but these were then subjected to abnormally high wear.
- The mill has a second 65 h.p. diesel engine set up to drive a 15 kw electrical generator – described by Mr. Flamwell as "like a carthorse in a rickshaw". This generator was expected to drive the rest of the mill, namely a heavy re-saw, a push bench, a planer, and a pendulum cross-cut, all with built-in motors requiring at least double the power the generator can provide.

CHAPTER 5: SOCIAL LIFE IN TABORA

Tabora, until the end of World War 1, was the capital of Tanganyika or, as it was known then, German East Africa. During the course of the war the General in charge of Germany's African armies (Tanganyika and Namibia), Paul von Lettow-Vorbek, with a small force consisting of 3,000 German and 14,000 African soldiers (or Askaris), held in check an allied force estimated at 300,000 British, Belgian and Portugese, finally surrendering undefeated after the armistice in late 1918. The only reason I mention this is that the main government offices in Tabora were in a large German-built stone and concrete fortification ("The Boma") that had been Lettow-Vorbek's original headquarters. My office walls were two and a half feet thick and coming back to the office after a hot day in the field was like entering a cool cave.

The Boma

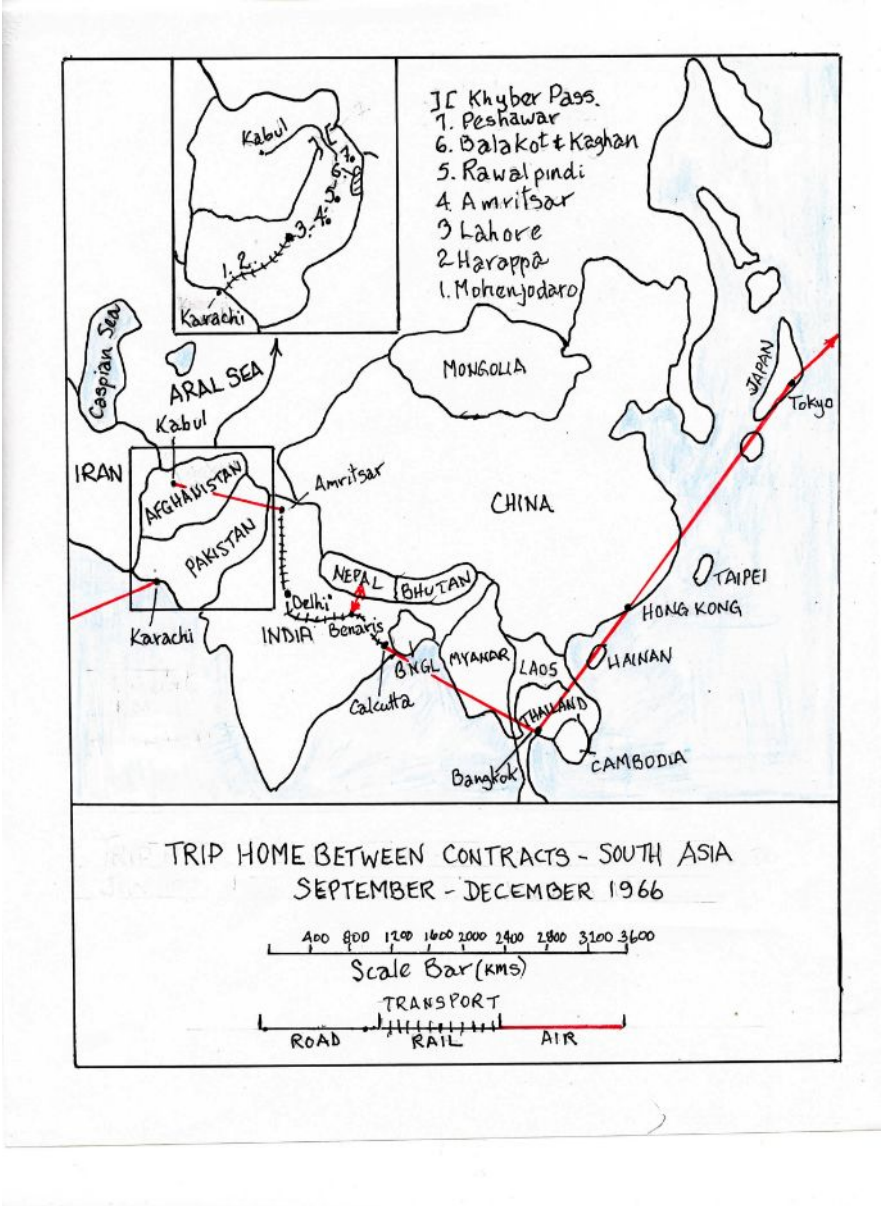
At home in Tabora

The house assigned to us was, likewise, German-built of local stone with large windows and a screened porch aligned to take advantage of the prevailing breezes – German tropical genius and no need for air-conditioning. To complement the house we hired a highly recommended cook/houseboy (who was certainly not a "boy", having served as a sergeant with the King's African Rifles in North Africa and Burma during World War 2). Shabani was an absolute gem and appointed himself our "Honorary Father" and general protector. He was also a pretty good cook, though everything tended to be a little on the well done side. We also inherited a dog from some departing friends – a very gentle, friendly black Lab. We named him Hector in hopes that the heroic name would inspire him to be at least a nominal guard dog (to no avail because the only danger to anyone was being drooled to death).

Social life in Tabora centred on the Tennis Club, which also had a little theatre group One of the things we did each year was to put on the two Shakespeare plays that the two secondary boarding schools were studying. The Tanzanian students loved Shakespeare and it was most disconcerting to go on stage to deliver your lines and hear a hundred quiet voices reciting along with you (no need for a prompter).

CHAPTER 6. CHRISTMAS LEAVE TRIP HOME: 1966

In July 1966 the Chief Conservator of the Tanzanian Forestry Department, Geoffry Kileo, requested to the Canadian Government's technical aid program (Canadian International Development Agency or CIDA) that I return on a second two-year contract, which was approved. In September 1966 we took a 4-month home-leave and traveled back to Canada for Christmas through Pakistan, Afghanistan, India, Nepal, Thailand, Hong Kong and Japan (see Map.1)



CHAPTER 7. CIDA CONTRACT IN TANZANIA: 1967 TO 1969

We returned to Tanzania in mid-January 1967 and my first task was to go back to Tabora with a department Land Rover to pick up the personal effects we'd packed and left behind in the Forest Department warehouse and, of course, Hector. He seemed happy enough to be reunited but didn't seem to have missed us all that much because the family we had boarded him with had young children who had spoiled him rotten.
Very soon after our arrival decided that on a CIDA salary we could afford our first automobile and chose a front-wheel drive Renault 4 (brand name ROHO, Swahili for "HEART"). As we'll describe it was a great little car that finally died in Fernie, B.C.

The car gave us the opportunity to tour many of the Game Parks such as Ngorongoro Crater (above left) and Serengeti (above right). I had originally been told that I would return to work in the Silvicultural Reseach Section in the Lushoto Highlands, but my old UBC friend Parker Williams, who had come out to Tanzania in 1965 as Forest Surveyor, convinced the Department that I would be more valuable working with him in Dar es Salaam in forest mapping from aerial photographs, and to fill in for him when he went on home leave in the fall. I spent the next 7 months training staff in photogrammetric forest interpretation and mapping, carrying out mapping of forest plantations and protection forests, and acting as Forest Surveyor while Parker was on his 4-month home leave. To accomplish all this Parker had resurrected a WW2 British photogrammetric technique, known as the "slotted template method of scale control", with obsolete equipment rescued from the basement of the Tanzanian Land Survey Office. Actual mapping, which was my job, utilized another piece of obsolete equipment called a Kail Radial Line Plotter.

This whole process required, for scale control, many 10x10 inch sheets of heavy acetate plastic – one for each of the several hundred photographs per mapping project. Parker had the brilliant idea of going to the local hospital to see if they could spare some old x-ray plates. The hospital was overjoyed because they had a whole basement full of the things that they no longer wanted and told Parker to "fill-his-boots". He went back several times and each time had to soak the plates in the family bathtub to remove the silver nitrate images, which left, according to wife Anne, an incredible ring around the tub. Through 1967 we mapped all of

the softwood plantation areas in the northern and southern highlands and I had the pleasure of visiting all the areas to "ground-truth" our completed maps (finding out to my surprise that some of the senior British officers couldn't read a map to save their lives. Him: "Well! This isn't right! This is supposed to be *Pinus radiata* not *Pinus patula*". Me: Sigh! "Yes, but if you follow the road you'll recognize that you're not where you think you are". Him: "Oh, yah!")

On Parker's return, while I continued to do some mapping work and staff training, I was formally transferred to the Silvicultural Research Section, where I worked on natural forest regeneration and plantation establishment research, and soil mapping studies with soil scientists from the East African Agriculture and Forestry Research Organization (EAAFRO) on the coastal plain of Tanzania, until my final departure from Tanzania in January 1969. On several visits to the research headquarters in Lushoto, I was able to troll through dead files of research projects that had been completed but never analyzed and written up. From these I was able to publish four papers in the Department's silviculture research notes. I also published a paper on some nursery experiments I had carried out on two important native commercial hardwoods (mninga and mkora) in Tabora.

In my four years in Tanzania I learned more about forest management than I had in the previous five years of university.

John at home and Mary at the beach in Dar

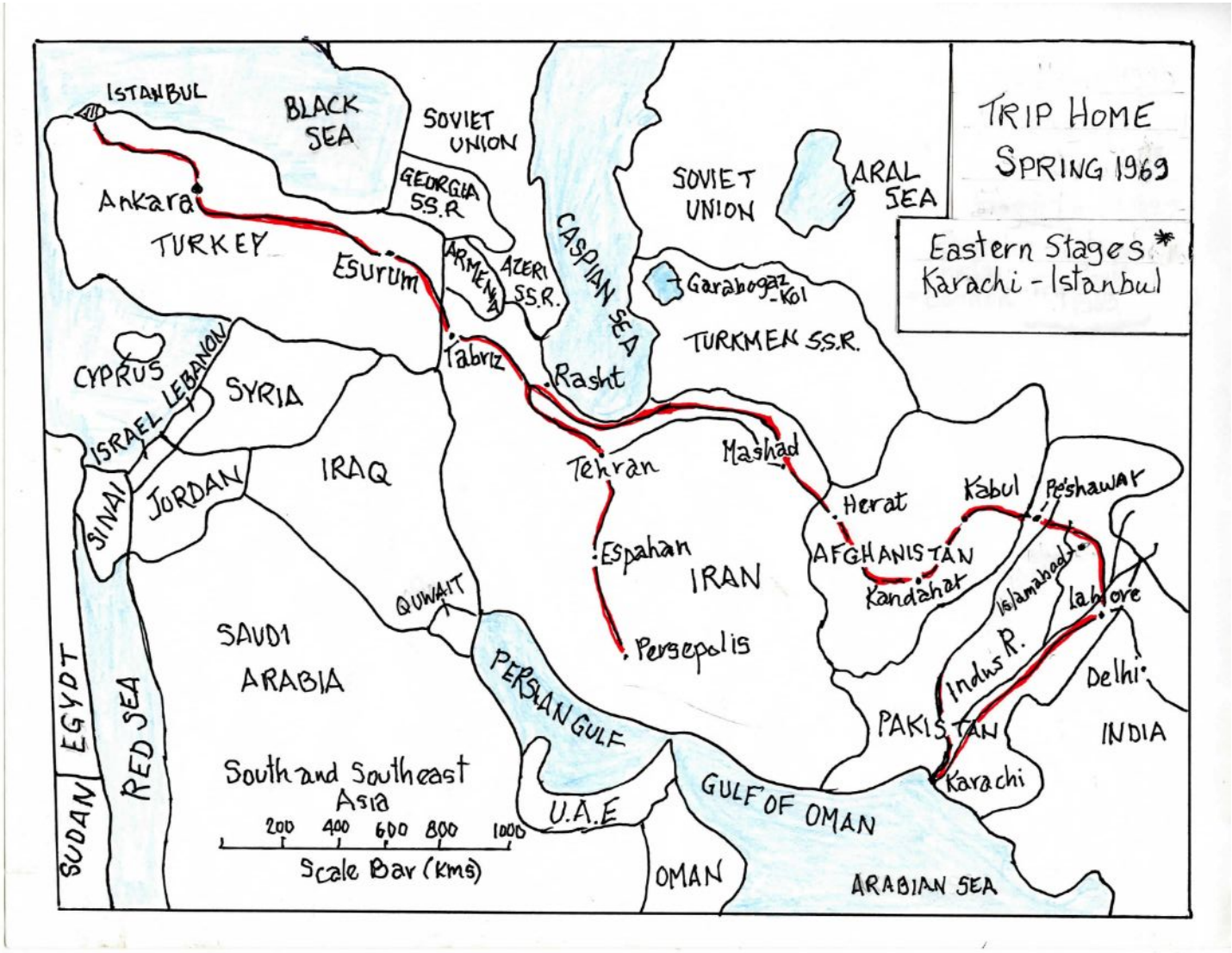
CHAPTER 8. OVERLAND - PAKISTAN TO ENGLAND AND OXFORD: 1969

While I had been away, the UBC Forestry School had undergone fundamental change and was becoming a real natural resource management school. I applied to do a M.Sc. and was accepted, and at the same time was accepted to do a 4-month diploma course in Forest Research and Biometrics (statistical analyses) at the Commonwealth Forest Institute in Oxford, U.K. My contract in Tanzania ended in January and my course in Oxford started in June so we had about five months to kill and decided to drive to England. In preparation, I went to our local Renault dealer and stocked up on his recommendations for spare parts that we might require for our Renault 4 on the trip.

The trip was another of the "formative" experiences of my life. We shipped our car (and ourselves) on a vintage "Pacific and Orient Lines", cruise ship named the S.S. Karanja from Mombasa in Kenya, via the Seychelle Islands, to Karachi in Pakistan. From Karachi we travelled northwards up the Indus valley to Peshawar on the Afghan border and then via Afghanistan, Iran, Turkey, Eastern and Western Europe, to England and Oxford.

Snow on the mountains of the Hindu Kush.

The Oxford course was great! Statistics was taught by Dr. Collier Dawkins, former Chief Conservator of Forests in Uganda and a self admitted math hater. For the first time I actually understood statistical analyses because he explained the intent of the all of the statistical techniques in simple English (like "error variance" which has nothing to do with error but is variability in a set of data that can't be explained by either natural conditions or treatments! Grrrr!) He had also published an excellent document called "Statforms: Formats For Elementary Statistical Calculation", which provides step-by-step guidance for sampling and experimental design, and all statistical analyses from simple t-tests to analysis-of-variance and co-variance. In the course of the four months, we visited all of the major U.K. Forestry Commission research establishments from Southern England to Central Scotland. I was subsequently given credit towards my MSc for the Oxford course by UBC.


TRIP HOME
SPRING 1969
Eastern Stages *
Karachi - Istanbul
ISTANBUL
BLACK SEA
SOVIET UNION
GEORGIA S.S.R
Ankara
TURKEY
ESURUM
ARMENIA
AZERI S.S.R.
CASPIAN SEA
SOVIET UNION
ARAL SEA
Garabogaz-Kol
TURKMEN S.S.R.
Tabriz
Rasht
CYPRUS
ISRAEL
LEBANON
SYRIA
IRAQ
Tehran
Mashad
SINAI
JORDAN
Herat
Kabul
Peshawar
Esphahan
IRAN
AFGHANISTAN
Kandahar
Islamabad
Lahore
QUWAIT
Persepolis
SAUDI ARABIA
PERSIAN GULF
Indus R.
Delhi
INDIA
PAKISTAN
EGYPT
RED SEA
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South and Southeast Asia
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200 400 600 800 1000
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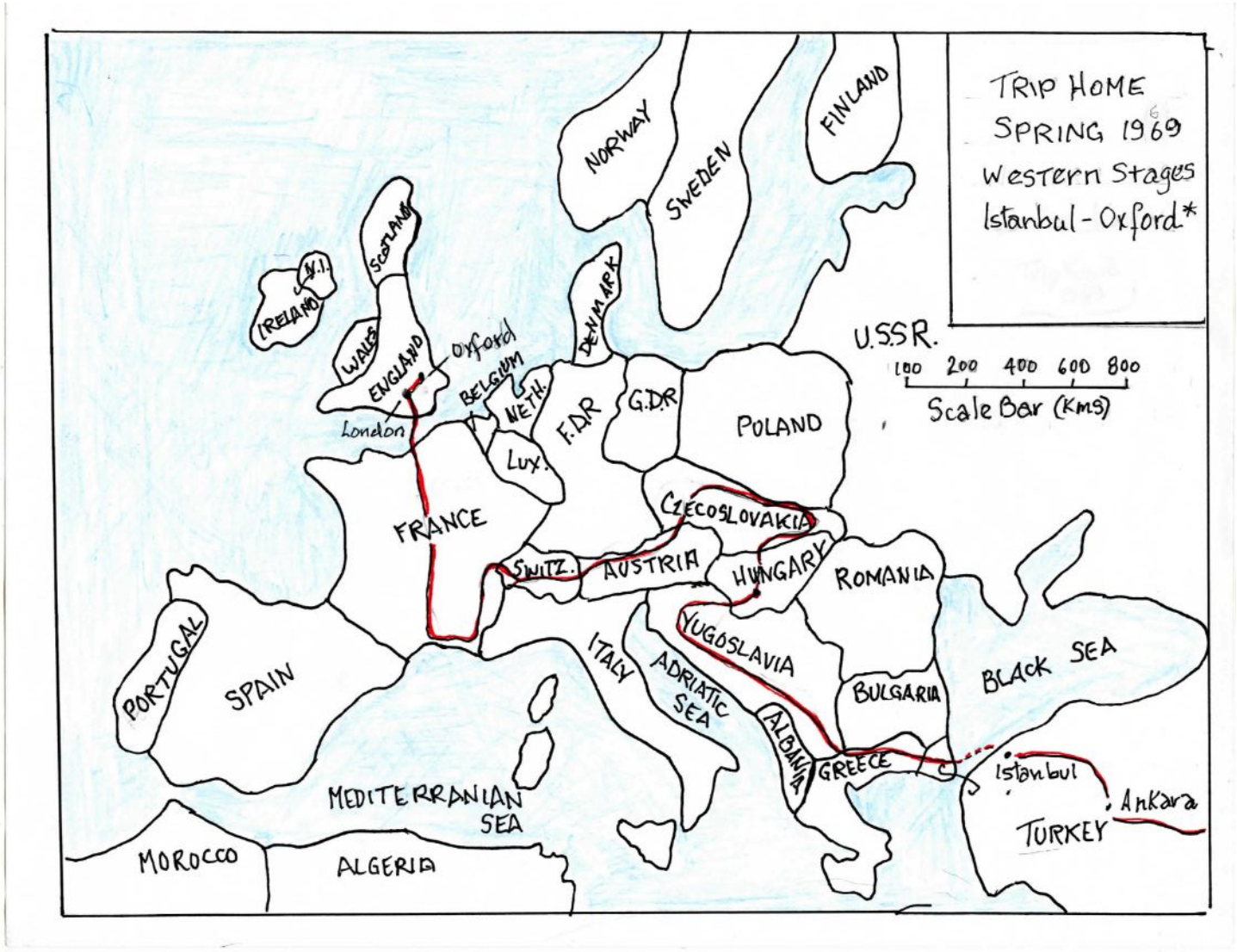

TRIP HOME
SPRING 1969
Western Stages
Istanbul - Oxford*
NORWAY
SWEDEN
FINLAND
U.S.S.R.
100 200 400 600 800
Scale Bar (Kms)
SCOTLAND
N.I.
IRELAND
WALES
ENGLAND
Oxford
London
BELGIUM
NETH.
DENMARK
F.D.R
G.D.R
POLAND
LUX.
FRANCE
CZECOSLOVAKIA
SWITZ.
AUSTRIA
HUNGARY
ROMANIA
YUGOSLAVIA
ITALY
ADRIATIC SEA
BULGARIA
BLACK SEA
PORTUGAL
SPAIN
ALBANIA
GREECE
Istanbul
Ankara
TURKEY
MEDITERRANIAN SEA
MOROCCO
ALGERIA

CHAPTER 9. UBC POST-GRADUATE STUDIES: 1969 to 1971

My two post-graduate years at UBC exceeded my expectations. I really enjoyed a huge variety of natural resource management courses that were never previously available in the faculty. Among the most useful were wildlife management, hydrology and watershed management, soils and surficial geology, landscape analysis and geo-science, wildland recreation management, advanced silviculture and systems ecology, and plant physiology.

I received the UBC Research Forest Fellowship for my first year, and was encouraged to work under the direction of the newly appointed Head of the Research Forest, Jack Walters – first, to assemble data on the forest from faculty files, and second, to spend the summer of 1970 on the research forest to determine whether I could prepare a management plan for the forest with the data and time I had available. This management plan would be used as my MSc thesis. Though the fellowship excused me from teaching, I agreed to be teaching assistant both years in the first year dendrology (Prof. John Worrell) and second year silviculture (Prof. Phil Haddock) courses.

By the fall of 1970, Jack Walters and I had concluded that there was not enough reliable, organized information on the forest to develop a credible management plan at that time. One of the most astonishing things was that over the previous 10+ years, clear-cut harvesting had been carried out on 18 separate areas ranging in elevation from about 250 meters to 600 meters. No mapping had been done on these felling coupes, and timber volumes could not be related to individual felling sites because all wood was "scaled" (or measured) at the Forest's main gate. I spent most of the summer documenting the many on-going research projects (which had no apparent, overall coordinating strategy) and creating a historic felling coupe map from aerial photographs using the directions of still-visible skid trails to help delineate the boundaries. So, the single most important research forest in B.C. had been treated in the same way as any commercial forest operation – as a "cash cow", in this case for the Forestry Faculty. Lost was any opportunity to go to industry and say "There are several silvicultural and harvest management options for coastal old-growth forests, let us research these options and provide you with advice". I primarily blamed two people for this myopic vision: the Forest Manager at the time, Gerry Tessier, and the Faculty's Forest Management Professor, Dr. Harry Smith.

The major and WONDERFUL event during this time at UBC was the birth of our first child – Kirsty Maria Elizabeth on June 1, 1970. Unfortunately Mary suffered a severe post-partum depression immediately after Kirsty's birth and required many weeks of hospitalization and treatment. Mary's mother Elizabeth helped out whenever she could but much of the time I was on my own and I was able to bond with my new daughter. I was also teaching Labs in Dendrology and when Elizabeth couldn't help, I just put Kirsty in the backpack and took her to school. It was the first year that UBC forestry had female students – three wonderful (and brave, given the latent misogyny of the forestry profession) young women. Kirsty was a wonderful baby and very content, but at the first "peep" one of the three was immediately "in attendance".

Thus for several reasons I left UBC without a Master's degree. On the basis of my course work I could have opted for an MScF without thesis. I chose not to, as I was determined to complete a thesis sometime in the future. At this point, at the suggestion of my Professors, I applied to the Association of Professional Foresters for professional (R.P.F) accreditation. The Association decided that if I had graduated with a BSc in Forestry, given my experience and subsequent education, my accreditation would have been straightforward. However, because my original degree was in Biology, I would be required to complete courses in economics and business administration before I would be considered. When this became known Dr. Bert Brink, Professor of Range Management at UBC contacted me. Dr Brink offered to sponsor my application for accreditation as a Professional Agrologist, so I became a R.P. Ag. Later with the creation of the Professional Biologists Association I also became an R.P.Bio., though neither professional accreditation was ever of much consequence in my career. One of my subsequent World Bank managers brought me down to reality when I told him of my professional accreditations by saying, "That's very nice but remember, you're only as good as your last project".

CHAPTER 10. OVER TO THE "DARK SIDE" - KAISER RESOURCES: 1971 TO 1973

I left UBC in March 1971 and at this point my career took a rather unexpected turn because the best job offered to me was 'Land Reclamation Superintendent' for the Kaiser Resources open-pit coal-mining project in the Elk Valley of the East Kootenay. I was recommended for this job by one of my UBC faculty advisers, Dr. Jack Thirgood, who had done some consulting for the Company. Kaiser Resources Ltd. was a subsidiary of the Kaiser Steel Company of Oakland, California and had acquired the majority of private coal properties previously owned by Crowsnest Resources Ltd., which had logged and mined underground and on small open pits in the East Kootenay since the early 1900s. The real problem with this arrangement was that Kaiser Resources Ltd. had no coal mining expertise and instead of hiring qualified mining staff, fell back on the "in-house expertise" of Kaiser Engineers Ltd. in Oakland, California and left-over Crowsnest Resources staff (who were mainly forestry engineers) - and they pretty much made things up as they went along, as illustrated by the following examples:

- The mining operation produced high-quality coking coal for the Japanese steel industry, which required washing to remove non-coal contaminants before shipping.
- Kaiser Steel designed the coal preparation plant but totally misinterpreted how friable the coal was. All wash plant waste had to discharged to tailings ponds for settling and storage, but it was soon recognized that the ponds were filling up 3-4 times faster that expected because the plant couldn't recover the finer coal particles and was thus losing "product". The guts of the plant were removed and replaced at a cost of (we were told at the time) $24 million. The older tailings ponds were subsequently re-mined and re-washed to recover useful coal.

- The open pits and overburden dumps were well above the Elk Valley and drained to settling ponds for sediment control to protect downstream water quality, in the Elk River (east) and Michel Creek (west). The eastern pond was constructed first, with a large concrete spillway, at a cost of $5+ million and with an estimated useful life, before dredging, of 15 years. To the astonishment of everyone it filled up in five years because the Kaiser Engineers, who generally worked in low-gradient stream systems in

- California, had designed for suspended sediments only, neglecting to consider coarser bed-load, which skips along the stream bottom and is the major material transported in high-gradient mountain systems. The pond required dredging every five years thereafter to provide adequate retention time. For the western pond the engineers decided to try to get it right and created a huge excavated pond area with an equally impressive concrete dam and spillway at a combined cost of almost $10 million. Unfortunately there were no surficial geology studies done, and the base of the pond was a huge glacial-outwash deposit of very coarse rock. Once the pond was excavated, removing the organic and fine soil "capping", the stream entered the pond area and immediately disappeared underground and didn't reappear for about 500 meters below the spillway. I have been told that the spillway never in subsequent years passed any significant water.
- A major initial mining equipment purchase was a Page Walking Dragline Excavator – a truly remarkable machine (see photo on page 26). It had a cab as big as a two railway cars, walked on two huge feet (or spuds), had a 125 ft. (38 m) long boom, and a 7 cu. yard bucket. The cost of this machine was (we were told) approximately $60 million. The problem was that a dragline works most efficiently on flat ground - it was entirely unsuitable for the mountainous terrain of the Kaiser minesite. So much work had to be done by smaller excavators to even create a bench on which the dragline could operate that the whole process was completely uneconomic. The dragline was subsequently sold at a fraction of its original purchase price to the nearby Fording Coal operation, which had substantial valley-bottom coal deposits.

One of the first things I did on assuming my duties was to review the current mine plans and the reclamation program that had been submitted to government in 1969 to obtain the mining permit and establish the level of our performance bond (see Chapter 12). I was absolutely horrified to discover that our reclamation plan was so lacking in substance that it begged the question of how we had even been able to obtain a mining permit, and the current mining operation bore no relation whatsoever to the (significantly out-of-date) plans that had been submitted to Government. I took the mine plans to the engineering department and the staff broke into gales of laughter, which ceased pretty abruptly when I pointed out that under the circumstances we were certainly operating illegally and subject to prosecution. The Mine

Manager, Harry Conger, was not amused and made it a priority to prepare a new submission, including current and proposed 5-year mining plans and an improved reclamation program, and to ensure that these were updated on a regular basis.

The reclamation program I had inherited was entirely dependent on non-native species - Russian olive (*Elaeagnus angustifolia*), Siberian elm (*Ulmus pumila*), Norway spruce (*Picea abies*). Exactly what my predecessor had in mind here was a puzzle because the first two species were classed as seriously-invasive in drier rangeland sites of the Southern Interior by the Invasive Plant Council of B.C. In fact, as I arrived, an order had been placed for $125,000 worth of planting stock from a nursery in Alberta. I immediately cancelled the order and we embarked on a native plant seed collection and propagation program - we had a 3 ha nursery and a fully automated greenhouse capable of producing 250,000 container plants a year, that had hardly been utilized. By the time I left, a bit over two years later, we were beginning to be self sufficient (given the, still limited, amount of land coming available each year) in native plants from provenances (seeds and cuttings) we had collected from all elevations (670 - 2100 m or 2200 – 6890 ft.) on the mine site.

Early on I went to the Manager of Administration and asked to have an accounting system set up to track the costs of reclamation activities. He said "Great, how many cost codes do you want?" I replied ten. He said "TEN!! Even the maintenance complex has only four!!" I explained that no one had yet properly costed reclamation operations and it was about time someone did. I got my 10 cost codes: 1) Management/administration; 2) Government permitting and reporting requirements; 3) Native seed and cutting collection; 4) Commercial seed purchases; 5) Plant propagation (nursery and greenhouse); 6) Slope reduction and initial site preparation; 7) Final site preparation, seeding and planting; 8) Purchase/leasing and operation of irrigation and other equipment; 9) Ongoing site maintenance (replanting, spot seeding and fertilization); and 10) Site monitoring and assessment.

I was extremely fortunate in having program-continuity provided by the foreman of the reclamation program, Tony Milligan (pictured), a large, gentle, extremely competent Scotsman with an agronomic background, who was integral to the success of the program. Added to this was an unexpected bonus when one day I met on the street in Sparwood Roger Berdusco, a 3rd year forestry student at UBC who I knew from my UBC teaching activities. I hadn't realized he was from Sparwood and when I found out that he had come to take a menial, but well paying, job with the Company – "mudding the doors of coke ovens" (don't ask) and living at home - I went to management and had him transferred to our program (at a supervisor salary). Tony and Roger worked really well together for the next two summers, and shared both nursery and field operations. We were also lucky to have a happy band of local women who were great nursery staff and tree planters – much preferred to ham-fisted men. Roger after graduation went on to become the manager of reclamation and environmental services for Fording Coal in the upper Elk Valley.

Another really positive addition to the environmental program was the appointment of Bill Matheson, a M.Sc. grad from McMasters University as pollution control officer.

All of this was on the up side, but then there was our direct supervisor who I will refer to only by his initials - J.J. His official position was 'Assistant to the Vice President' but he always described himself as 'Assistant Vice President'. J.J. was hands down the stupidest and most incompetent person I've ever worked with, or in this case for (grrr!). J.J. had been a metalurgical chemist for many years with Crowsnest Pass Coal Company (CPCC). He was a single, never married, and in his mid-fifties and lived in Fernie with his mother. The rumor in Kaiser was that even in CPCC he was seen as such a loser that the whole deal with Kaiser on the coal properties was conditional on Kaiser taking J.J.

J.J. left me pretty well alone because, as he said often, he didn't really "understand the biology stuff", but he eventually drove Bill out of the company. Bill and I once went to an extra-judicial Pollution Control Board hearing in Cranbrook where J.J. unwisely decided to represent the Company. When the Pollution Control Board Chairman asked J.J. if Kaiser would agree to release company air quality data for the area around Sparwood, he replied "Of course". I thought Bill would have a coronary! No Company air quality data existed at the time because J.J. wouldn't approve funding for the equipment (high-volume samplers) needed for its collection. In fact, the only air quality data available for the mining vicinity was from a provincial government sampling station on the roof of the Sparwood town hall. Shortly after this Bill elected to leave the company because he was feeling both professionally and legally compromised by J.J. A huge loss!

My own experiences with J.J. were much more in the plain "dumb and dumber" categories. One of the things I inherited in the program was a hydro-seeder. It consisted of a 10-ton truck with a 500-gallon tank on the back, into which went a slurry of water, peat moss, fertilizer and grass/legume seeds. The slurry was shot from a hydraulic "gun" mounted on the top of the tank. The machine was so heavy and cumbersome that it could only operate on flat ground and main roads, and the maximum range of the "gun" was about 15 m. on a good day with a tailwind. The only practical uses of the machine were in seeding the main haul road banks (we created several miles of vertical grass "wall-gardens" on rocky road cuts), flat bare accessible grounds at lower elevations, and spraying water in mid-summer around mine offices and other facilities for dust suppression - very limited applications for such an expensive piece of equipment!! At the end of the first summer I suggested to J.J. that we sell the hydro-seeder and invest in more flexible and useful pieces of equipment. He reacted with considerable shock, saying that it was his personal decision to purchase the machine and "it was meant to show the community that we were really serious about reclamation" (?!).

We had two major reclamation challenges that we really needed to address and didn't have the right equipment to deal with. The first was the large areas of very steep overburden dumps on the main Harmer Ridge mining area, which were 125 to 150 m in vertical height, with slope lengths of 230 to 290 m. The dumps were concave in shape with crest slopes of 36 to 45 degrees, mid-slopes of 26 to 35 degrees, and tail slopes of 15 to 25 degrees. Their

configurations had implications for overall stability (over the previous six years there had been eight major dump failures several involving equipment losses, and two resulting in worker deaths and one in serious injury), and for eventual reclamation. Several studies in Western Canada and the U.S. at the time concluded that, on excavated materials over 25 m in length, the maximum angle at which productive, self-sustaining vegetation could be established is between 25 and 30 degrees, with preferable angles between 20 and 25 degrees. Clearly we had some work to do! – and some convincing, because miners HATE to re-handle waste material. The second challenge was the large wash-plant tailings ponds in the Elk Valley of over 200 ha that were a serious source of noxious dust pollution to Elkford and surrounding communities.

For both challenges, J.J. suggested that we brainstorm possible "practical" uses for the hydroseeder. He came up with two, and I swear I'm not making these up:

- For overburden dumps, install a winch on top of the tank with a cable and harness and attach a fire hose to the gun. Lower summer students in the harness/ cable/winch down the slope, hydroseeding as they descend. I had to remind him about hydraulic head and the reality that the student wouldn't get very far down the slope before pressure from the combination of pump and hydraulic head would make it impossible for the student to control the sprayer and he/she would become a mere appendage to the end of the hose; and
- For tailings lagoons, do a little grading of the top of the containment dykes to allow the hydroseeder access and spray from the dyke. I had to remind him that with a maximum range of 15 m and tailings ponds varying from 20 to 45 ha (50 to 120 ac), the amount of area that could actually be treated from the dyke would be negligible. He then speculated on the possibility of using thick (4" x 10") wooden planks laid end-to-end in two rows by summer students (he was great on considering these potentially expendable) to create an access "road" for the hydroseeder into the centre of the ponds. I had to point out (in very polite terms, of course) that this was a little too ridiculous even for him, given the probability of losing this heavy machine in these materials consisting of a maybe 0.5-1 m. of dry-ish crust over 5 -10 m. of "slimy loon shit".

We finally got rid of the hydroseeder – I think we palmed it off on Fording Coal, at a "bargain-basement price, because it had many low-elevation, accessible valley-bottom coal seams. For the tailings ponds we purchased a small four-wheel drive tractor with floatation tires and a seed "hopper" on the back, and a set of light, "floating" agricultural harrows. To counter the related problems on these black materials of extremely high surface temperatures in summer (well above the thermal death point of plants) and wind erosion/dust pollution, we rented a movable agricultural irrigation system, which worked very well. Within two years we had a pretty good grass cover and dust control on these difficult materials. Of course, as mentioned earlier, eventually most of these reclaimed areas were reprocessed to recover lost product.

Overburden dump instability was a harder "nut to crack" given the obvious costs, but there were serious and developing problems of dump stability. As already mentioned, a number of

incidents had occurred where trucks and dozers were destroyed in dump failures, two involving operator deaths. I regularly did dump inspections, particularly of those that were no longer in operation. In the early spring of 1972, one of these that was directly above the Elk River was, in my view, showing alarming signs of instability. I took pictures of widening cracks and slumps on the dump platform, and showed them at a management meeting. I said that in my judgment we should begin immediate re-sloping to achieve both a more stable angle and to weight (stabilize) the toe of the dump. An elderly ex-Crowsnest Resources engineer was directed to visit the dump with me for an inspection and after looking at the situation, he made one of those statements that one couldn't actually disagree with but was totally ambiguous. He dismissed my concerns at an executive management meeting with the comment that the dump was "as stable as it will ever be". Three weeks later the dump failed catastrophically and nearly dammed the Elk River. The company was fined under both the Provincial Pollution Control and the Federal Fisheries Acts, and I immediately got three dozers – a D9 and two D8s - with excellent operators, dedicated to the reclamation program. Throughout the spring and early summer of 1972 and again in 1973 we began to re-slope, plant and seed the failed dump and a number of older dormant dumps at lower elevations that had created sediment problems for years, with really promising results.

In so many respects, Kaiser Resources was perhaps the most incompetent and dysfunctional organization I've ever worked for (so much for the myth of the "efficiency of big business"). I think one of the greatest travesties was the treatment of the Vice President and General Manager Harry Conger who had been hired, after all these major blunders, to turn the company around. I had the greatest respect for Harry – he was incredibly knowledgeable about mining and processing, actually listened to staff, and was very decisive. In about three years he had substantially improved the company's technical performance and put it on the road to financial recovery. In September 1972 he was given the "Golden Handshake" and the company President's son, Edgar Kaiser Jr., took over and got all the credit. At the same time J.J. was "retired" and a new Manager of Environmental Services, Lew Dwarkin, appointed to be based at head office in Vancouver. Lew turned out to be a breath of fresh air.

In November of 1972 my professor at UBC Jack Thirgood phoned me to say that the organizers of an international symposium on surface mine reclamation to be held in North Dakota would like us to give a keynote address on our "Rocky Mountain reclamation program". He and I would give a joint presentation. When I got more details of the symposium I approached Lew Dwarken with the invitation when he next visited the Sparwood office in mid-December, and he was very positive. He was going back to Vancouver and said he would take the request to Edgar Kaiser Jr. I didn't hear anything immediately but assumed that I might after the holidays. In early January Lew came up to the minesite and asked me to come and see him. He told me that Edgar Kaiser Jr. had turned the request down because "We've had a lot of bad press lately and we don't want to do anything that would call attention to ourselves". Needless to say I was disappointed, but it did cause me to rethink my future at Kaiser. Given my professional background I recognized that I had little chance of significant advancement within the Company and any "recognition" would come from outside professional/scientific sources. By coincidence, I'd just been approached by the District Mines Inspector in Cranbrook to say that the Ministry of Energy and Mines

would like to offer me a position of Provincial Mines Inspector-Reclamation, based in Victoria. My wife Mary, was very positive about the move, particularly given the news we'd received from our doctor in September that we were expecting our second child, due in May, but said that the decision was up to me.

I thought very carefully about the alternatives and in the end opted to accept the Ministry of Mines offer, and told Lew Dwarkin that I was formally resigning from the Company. He expressed his disappointment and asked if I had any recommendations for my replacement. I told him that I had no doubts that Tony Milligan deserved the chance to be my replacement.

I eventually used my experience on the Kaiser mine-site as the basis for my M.Sc. thesis entitled "A Management Plan for the Rehabilitation of Surface-Mined Coal Lands in the East Kootenay, B.C.", which I finally completed in 1978. What I attempted to do with my thesis was to develop a template for a management plan for mine reclamation and environmental remediation that would meet the expectations of both the mine reclamation legislation and the more recently introduced Coal Mine Development Review Processes. I was very proud to have my thesis accepted by five of my most respected UBC professors: Roy Strang (Range Management), Jack Thirgood (Forest Policy), Hamish Kimmins (Forest Ecology), Philip Haddock (Silviculture) and Les Lavkulich (Soil Science).

CHAPTER 11. STILL ON THE "DARK SIDE" – THE MINISTRY OF MINES: 1973 TO 1975

In March 1973 I joined the Ministry of Mines and Petroleum Resources in Victoria as Reclamation Mines Inspector to "enforce the reclamation statute, and provide environmental extension services to the coal, metal, mineral and aggregate mining industries". This move was to have a fundamental influence on the future direction of my career. I was told at the time of hiring that I would work under a 'Senior Inspector' who was yet to be hired. We moved to Victoria in early March, rented a house and moved in with our relatively meager possessions, and I started work later in the month. I had been on the job for about three weeks when a very large man came into my office and introduced himself as J.M., the new Senior Reclamation Inspector. The first thing he asked me, which pretty well took my breath away, was if I could give him a copy of the reclamation legislation because he thought he'd better read it before he began to assume his duties. Exactly how he passed a job interview without any knowledge of the Act he was being hired to enforce was never explained, but certainly reflected the "old boys", rather incestuous, "revolving-door relationship" between the Ministry of Mines and the Mining Industry. He had come from an administration position in the B.C. Mining Association after a career as an underground mining engineer/manager with one of the smaller B.C. mining companies and as owner/manager of a small "shotcrete (a.k.a "gunite)" company, and had no surface mining or reclamation experience whatsoever.

The requirements for the rehabilitation of mining operations were created by both the Coal Mines Regulation Act and the (Metal) Mines Regulation Act in 1969. As alluded to above, my duties were to enforce the provincial reclamation legislation and regulations, to advise mining companies on current practices of disturbed land reclamation and pollution and erosion control, to develop reclamation guidelines and standards, and to carry out field inspections and assessments of company reclamation projects. My responsibilities included surface coal and metal mines, dumps of waste materials from all types of mines, coal and metal processing tailings ponds, and major aggregate quarries (sand and gravel). Both Acts required that every mine in the province had to be inspected at least once every 18 months for compliance with all aspects of the mining law, including the reclamation legislation. The previous reclamation inspector had been very elderly and not in very good physical health, and there had been few documented formal inspections since the legislation had been proclaimed in 1969. My new boss was, likewise, not in very good physical condition, and so it was obvious that much of the direct inspection responsibilities would fall to me. I began to plan for my "inspection season" and asked about transportation. The Chief Inspector informed me that there were no appropriate Ministry vehicles available in Victoria and asked if I could provide my own transportation and claim mileage from the Ministry. I went on a search in Victoria and located an ex-Highways Ministry ½ ton pickup truck in very good condition, which I bought. It served me well over the years. I started my journeys in April in Greater Victoria with the large aggregate quarries near Victoria in Colwood/Langford and then making a short trip "up-Island" to visit the Westmin Resources, Myra Falls Copper Mine in Strathcona Provincial Park, and the Utah International Island Copper Mine at Port Hardy.

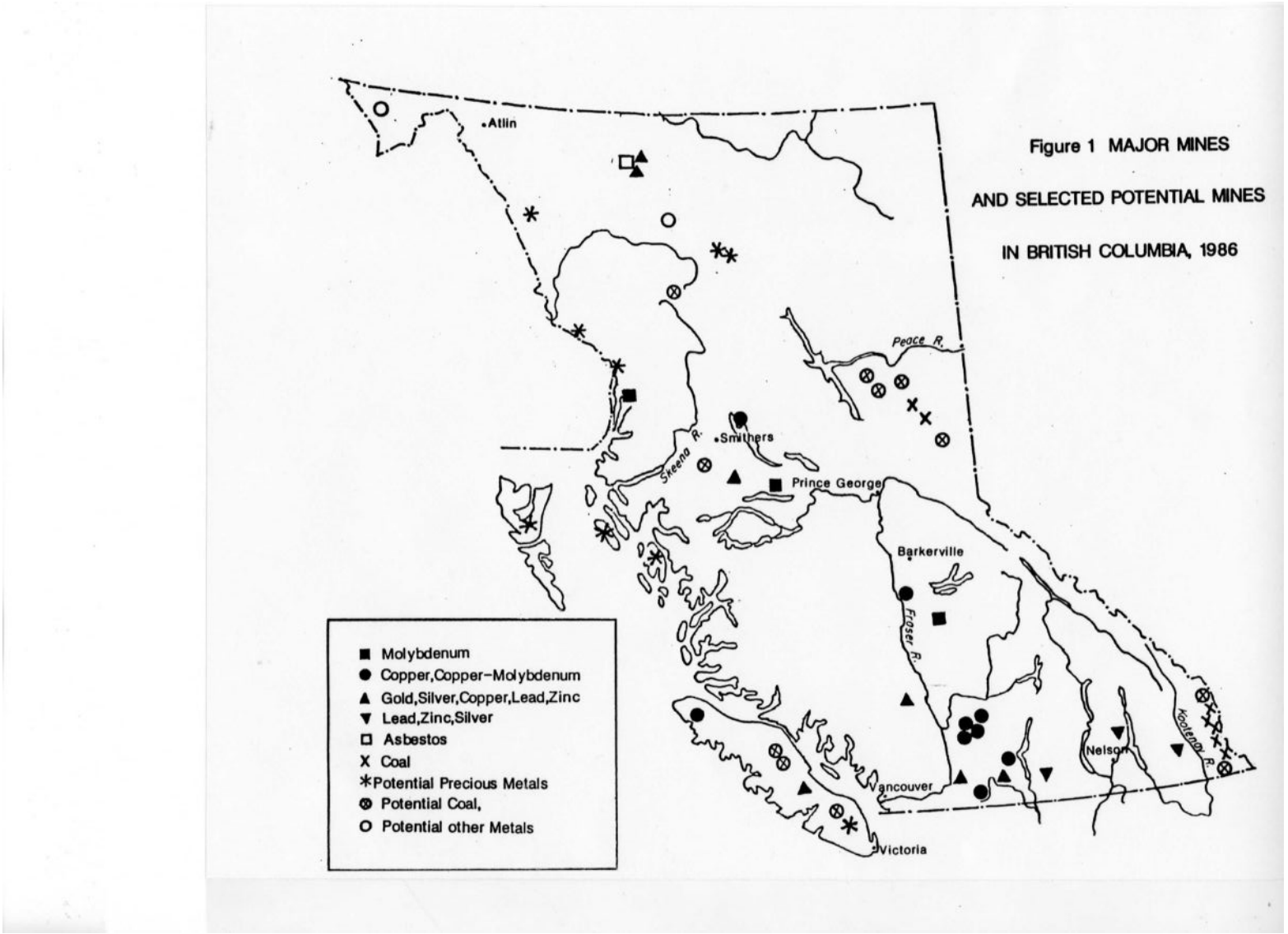


Figure 1 MAJOR MINES
AND SELECTED POTENTIAL MINES
IN BRITISH COLUMBIA, 1986
Atlin
Peace R.
Smithers
Skeena R.
Prince George
Barkerville
Fraser R.
Kootenay R.
Nelson
Victoria
Molybdenum
Copper,Copper-Molybdenum
Gold,Silver,Copper,Lead,Zinc
Lead,Zinc,Silver
Asbestos
Coal
Potential Precious Metals
Potential Coal,
Potential other Metals

The Myra Copper visit was an "experience", and an indication of things to come. The mine manager was very hostile at first, demanding to know why I hadn't booked an appointment. I reminded him that by law I didn't need an "invitation" to carry out a legal inspection and, in any case, I had phoned the week before and talked to his secretary to announce my visit. I also reminded him that Myra Falls was the most heavily bonded mine for its size in the province, being bonded both by the Mines Ministry and the Provincial Parks Branch. I assured him that my objective for the visit was to advise him on how to meet the legal environmental and reclamation expectations of the two agencies. At this point, he became quite reasonable and took me on a personal tour of the mine. Unfortunately I didn't have very good things to tell him.

The operation at this time was relatively small and there was only one fairly small waste rock dump (which as it turned out was fortunate), located on an open south-facing slope. The reclamation "technique" employed was to use a small dozer to cut horizontal terraces into the face of the already over-steep and failing dump and then use a bucket loader to scoop up "dollops" of soil and vegetation from the floor of a nearby old growth cedar/hemlock forest and dump these at intervals along the terraces. These, I presumed, were expected to spread "amoeboid-like" over the whole dump surface. To make matters worse, as we walked along the top of the dump we could see pools of bright orange water seeping from the base – indicating that there was a serious, developing acid mine drainage problem. I advised the manager that the reclamation "technique" simply wouldn't work because any vegetation from the shady floor of an old growth forest simply wouldn't survive on a sunny, rocky unstable slope. I also advised him to, as soon as possible, engage a competent pollution management consultant to design a long-term program to deal with the developing acid generation problem, and to begin collecting and treating the acid waters that were already being emitted from the dump. I told him that I would follow up with a formal inspection report with my recommendations when I returned to Victoria.

From mid-June I carried out three inspection tours:

- Along the southern Trans-Provincial highway to the Okanagan/Similkameen, West Kootenay, East Kootenay, Rocky Mountain Trench to Golden and then back along the Trans-Canada to Kamloops and the Highland Valley and returning to the coast;
- Through the Fraser Canyon to Cache Creek, then northwards through the Cariboo to Prince George, and then west to Smithers, the Skeena and Prince Rupert; and
- To Smithers by air with the Senior Inspector and by helicopter into minesites in the Stikine.

On returning to the office I prepared an inspection report for each individual mine visited, which I sent to the respective Mine Managers and District Inspectors, and at the end of the season I compiled an annual report on all inspections carried out, for the Senior Inspector and the Chief Inspector.

Over the course of the winter I was able to review all of the reclamation plans that had been submitted to the Ministry. I found that the quality of those reports varied greatly with maybe

a third being competent – generally the coal and larger mineral mining operations. No uniform standard of reclamation design and planning had been achieved by industry or, perhaps more important, demanded by the Ministry. The most commonly stated land use objective for reclamation (a prerequisite to program design) was wildlife habitat, however, in most cases neither the wildlife species nor the type and characteristics of the desired habitats were defined.

One particular reclamation consultant/contractor appeared to dominate the field. He was an agricultural specialist and had convinced several mining companies that they didn't have to spend money on site stabilization and preparation; they could rely entirely on seeding by helicopter with commercial agronomic species. He had a number of seed mixes that appeared, by name at least, to be formulated for specific areas. However, on closer examination, Special Similkameen Mix #1 for the southern, warm, dry ponderosa pine/bunchgrass zone was pretty much identical in species composition to Special Endako Mix #1 for the north/central, moist, cool, sub-boreal spruce zone. Seed was to be applied by air at up to ten times a normal range-seeding rate, and adapted seeds germinated and grew (but usually sparsely because of soil instability and compaction) and non-adapted species either didn't germinate or the seedlings quickly died. The technique was wasteful, expensive and, because of the lack of site preparation, gave generally poor results. In one rather comical case, however, a mining company in the dry southern interior created a berm along a major highway to "screen" (read "hide") its mine site from road travellers. They wanted "instant green" and therefore established an irrigation system along the berm. The area was aerial-seeded by the contractor with one of the "special mixes" and the result was a lush cover of moisture-adapted species that rapidly out-competed the slower-growing dry-land species. Things looked fine until the third year when the Company decided to save costs, shut down the irrigation, and everything died. If it hadn't been for the B.C. Ministry of Highways' ongoing roadside hydro-seeding program using a proper seed mix for the area the berm would have remained barren.

In the second year, I followed roughly the same inspection schedule. I worked with Alastair Fraser, head agronomist of Buckerfield Seeds, to establish long-term grass and legume species trials on several mine sites in different climatic zones of the province, and collected plant materials and conducted research on the propagation of native broadleaf trees and shrubs for reclamation use, with staff at the Federal Forestry Laboratory plant nursery at Burnside in Victoria.

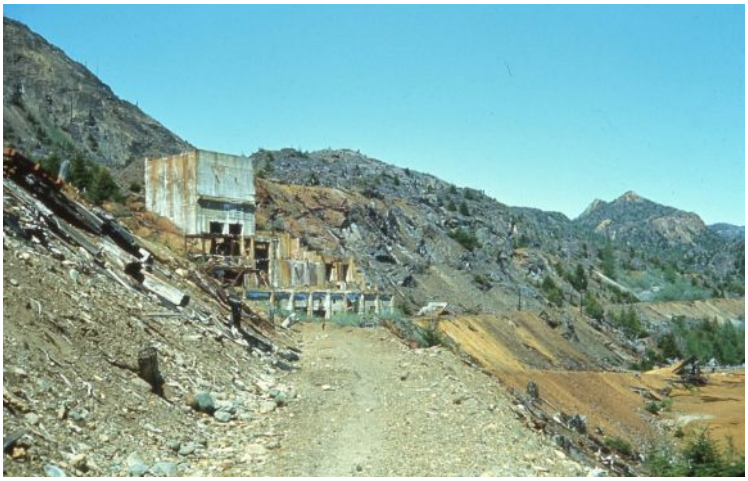
As I carried out my inspections I noticed that very few of even the minor recommendations I had made the previous year had been acted upon and finally raised the issue with a mining manager who had been very positive the previous year. He confided to me that over the winter several mine managers had approached J.M., the Senior Inspector, to ask how they should react to my inspection reports and he had told them that I was new on the job, very conscientious, but probably over-zealous. He advised them not to take any action for the moment and things would be "clarified" later. None of this had been discussed with me and I felt totally undercut. I was beginning to think that I really didn't have a future in the Ministry of Mines and perhaps I should begin to look for a new job.

On the bright side I visited a small metal mine in the Bull River area of the southern Rocky Mountain Trench that I had not been able to visit the previous year but had heard about from friends in the regional Fish and Wildlife Branch office. The mine was in the last few years of its life and the Mine Manager recognized that it was located on important elk and bighorn sheep winter range. He had approached Fish and Wildlife staff and asked for advice on what kind of a final topography and
vegetation would constitute appropriate wildlife winter range. He said he'd had no help from the District Mines Inspector and hadn't even been told of my existence. I visited the site with the regional Fish and Wildlife staff and my old friend Don Eastman who was head of Wildlife Research in Victoria. We were really impressed with what had been accomplished over the previous fall, winter and spring in terms of stabilizing and re-contouring the site. The mine manager also told us that he had approached seed suppliers and nursery operators in eastern B.C. and Alberta for appropriate, preferably native, grass, forb and shrub materials for re-vegetation. This, I thought, is the way in which the process should function.

I concluded my field inspections for the year in September and returned to Victoria to write-up my inspection reports. I was asked in mid-September by the Chief of Wildlife Management, Ministry of Recreation and Conservation whether I would be interested in applying for a newly-established position, that would soon be advertised, of 'Provincial Coordinator of Wildlife Habitat Management' in the Fish and Wildlife Branch. I told him that I was contemplating moving from my current position and would certainly consider applying for the habitat management position. I had a frank discussion with my UBC Professor Jack Thirgood and he concurred that I had probably gone as far as I could with the Mines Ministry under its current management. He told me that he had received an invitation to submit a paper to an international symposium on the "State of Mine Reclamation Practice in North America" to be held in Grand Forks, North Dakota, and asked if I would be willing to co-author a paper on B.C. with him. I replied that it would depend. If I were to remain in the Mines Ministry I would prefer to simply provide him with material and advice for a paper he would author himself. If, however, I was no longer with the Ministry, I felt that I could participate directly as long as he was the senior author. I later re-considered this and decided that since it would be obvious that much of the information in the paper could only have come from me, I might as well be up-front and take lead authorship. Jack agreed.

The Wildlife Habitat Manager position was advertised in November and I applied. The interviews were held in mid-January, and in early February I was offered and accepted the position. I advised the Chief Inspector of my intention to leave the Ministry and provided three weeks notice during which I would complete my few remaining inspection reports and provide advice on priority inspection activities for the following season.

BC Mine Inspections (clockwise from top left):
Anyox mine, Tulsequh Chief mine,
Bell Copper mine, reclaimed slope near Craigmont,
Placer mining near Wells, mineral exploration,
Equity Silver mine



In the next few months after leaving the Ministry of Mines I worked on my own time with Professor Thirgood on the "State of Mine Reclamation Practice" paper. While many of my contributions were critical, I also tried to make them as constructive as possible. Basically the message I presented could be summarized as follows:

- Though the reclamation sections of both the Coal Mines and (Metal) Mines Regulation Acts call for "a program for reclamation and conservation of the land during, and on discontinuance of the mining operation", no standards, or expectations, had been established by the Ministry for such a program.
- In the first four formative years of the legislation (1969 to 1972) no staff in the Ministry, at either the Victoria or regional levels, had any experience or knowledge of disturbed land reclamation.
- Though the Mines legislation calls for inspections relating to all legislated requirements to be carried out every 18 months, no specific reclamation inspections were carried out in the first four years.
- No provisions had been made by the Ministry to provide for interagency review of reclamation plans to confirm the appropriateness of reclamation land use objectives, to set appropriate reclamation standards, or to capitalize on ecological and re-vegetation expertise in other Ministries.
- Mine development and reclamation programs were required to be updated every three years, or whenever major changes to the mine plan occurred, but over half of the reports reviewed in 1973 were substantially out-of-date and no longer reflected current mine-site conditions.
- Inspection staff had paid little attention to either overburden dump or tailings lagoon stability. As a result, several failures had occurred, resulting in worker injuries and deaths and additional environmental degradation.
- The performance bonds required by the legislation to protect the public interest in the event of defaults by companies were entirely inadequate to allow even a minimal level of facilities decommissioning and site remediation.
- The Ministry had been very slow to react to, and develop the expertise to address, a serious, developing acid mine drainage problem on many mine sites throughout the province.

The paper was submitted and delivered to the symposium by Dr. Thirgood in July. In September I was visited in my office by the Deputy Minister of Energy and Mines Jim Fyles (for whom I had the greatest respect) who told me he was making a formal complaint to the Deputy Minister of Recreation and Conservation about the symposium paper. I asked him if he disagreed with any of the things contained in the paper. He said he did not - he just disagreed with my right to say them in a public forum. I told him that I didn't consider an academic symposium a "public forum" but we agreed to disagree. A few days later I got a call from our Deputy Minister, Lloyd Brooks, asking for a copy of the paper. A few days after that I got a note back with the comment that it seemed very well reasoned, technically informed and professional, and thanking me for the chance to read it. I don't know how much influence I had in the decision but shortly after this the Mines Inspection Branch seemed finally to get serious about its reclamation responsibilities and hired a really competent

vegetation ecologist, John Errington, and a water engineer with fisheries experience, Murray Galbraith, into the Reclamation Section.

CHAPTER 12. B.C. GOVERNMENT ENVIRONMENTAL AGENCIES: 1976 to 1989

1976-79 **Fish and Wildlife Branch** - Wildlife Habitat Management Coordinator

I joined the Fish and Wildlife Branch in early March. The Branch consisted of three divisions: Wildlife Management, Fisheries Management and Habitat Protection. It became apparent as I was introduced around the Branch that there was some confusion over exactly what my responsibilities were relative to those of staff in the very effective Habitat Protection Division. As soon as I could, I arranged a meeting with Jim Walker, Chief of Habitat Protection, to establish our respective areas of responsibilities: I would work primarily with Regional Wildlife and Fisheries Biologists to actively manage habitats on which the Branch had a legally-established management interest; Habitat Protection's primary responsibility would be to continue to assess and mitigate the impacts of the activities of other development agencies and private industries on important terrestrial and aquatic habitats throughout the Province. I agreed to provide my experience in forestry and mining to support Habitat Protection's activities in any way I could.

Over the previous 30+ years the Branch, and its predecessor, the Game Commission, had acquired management authority over many parcels of land through a variety of instruments such as land donations from private individuals and conservation organizations such as Ducks Unlimited and The Nature Conservancy; and Government consignment of authority through Cabinet Orders-in-Council or administrative notations of interest. Unfortunately, there had never been any disciplined and organized recording of these habitat acquisitions and the first task we had was to undertake a comprehensive search of Fish and Wildlife Branch and Ministry of Lands records, and to identify habitat donations from the various conservation organizations. My partner in habitat management was Bob Walker who, interestingly enough, was not a biologist, but came out of the real estate industry and had a comprehensive knowledge of the Provincial Land Registry System. I visited Regional Offices to talk to the wildlife and habitat biologists and troll through regional files, while Bob looked through land registry records. Over the next three years we identified over 300 properties in which the Branch had a registered conservation interest. We created a file for each property, recording the type of tenure, management partners (if any), and containing a simple biophysical description of the types of habitat involved, a list of important wildlife species, and a description of habitat management/enhancement activities planned or carried out.

The most enjoyable part of the job was getting out into the field to assist regional staff in "on the ground" habitat rehabilitation activities. Over my time with the Branch, these focused on two areas: grassland savannah ecosystems in the dry south/central interior and wetland ecosystems in coastal lowlands.

- Interior grasslands provide critical habitat for a large number of endemic bird, reptile and mammal species. Particularly important are winter ranges for iconic, large ungulates such as Rocky Mountain elk, and Rocky Mountain and California big horn sheep, and a large number of threatened small mammals, birds and reptiles.

- Historically, these grasslands had been managed for centuries by First Nations Peoples with regular, low-intensity fire - for plant and animal species for both food and cultural purposes. Fire prevention and suppression activities, from the early 20th century onward, has allowed the invasion of many of these grasslands by woody species such as lodgepole pine and big sage. I worked on experimental prescribed burns with Kootenay regional staff in the Rocky Mountain Trench and with Cariboo regional staff on the California bighorn sheep wildlife management area at the junction of the Fraser and Chilcotin rivers. Though these burns were generally fairly small and relatively contained, they were not exactly legal, and there was a need to formalize an agreement with the Ministry of Forests, Wildfire Management Branch, which was the legal permitting authority for "open burning". I worked with staff of both Ministries to develop a mutually-acceptable protocol for prescribed burn planning and implementation, which eventually included the following: land status; conservation values; fire history and ecology, prescribed fire objectives, respective agency responsibilities, fuel reduction and fire containment provisions, and monitoring (pre-burn, during-burn, and post-burn) and acceptable weather conditions.
- The coastal wetland area management programs were carried out with the cooperation and funding of the conservation organization Ducks Unlimited. Most of these areas historically had been influenced by spring freshet or tidal inundation, which enriched the systems with nutrients and maintained high levels of biological productivity. Many of these had subsequently been impacted by flood control (dykes) and transportation (causeway) construction, which limited input to these wetlands to rainfall and acidic runoff from upland coastal rainforests. Without the regular flooding and nutrient enrichment, these wetlands had been invaded by woody species such as red alder (*Alnus rubra*) and hardhack (*Spirea douglasii*), and were trending towards unproductive acidic bogs. The solution to this was to breach the containment dykes and causeways, and establish intake structures that would allow periodic, controlled inundation with riverine or estuarine waters. Planning, and obtaining permission, for these activities was the responsibility of the Fish and Wildlife Branch; engineering design and construction were carried out and funded by Ducks Unlimited. The main areas that I was involved in during my time with the Branch were Delkatla Slough (now a Nature Sanctuary) at Masset on Haida Gwaii, the Pitt Polder (now an ecological reserve) near Haney, and several estuaries on the east coast of Vancouver Island.

A major perk during my time with the Branch was the invitation from the Regional Wildlife Biologist (Harold Mitchell) and Regional Habitat Protection Biologist (Marty Beets) in Williams Lake to participate in an inspection of Crown land grazing activities by the Gang Ranch in the West Chilcotin. I think the reasons I was invited along were twofold: first, that I was in Victoria with direct access to senior decision-makers, and second, I was at the time a Registered Professional Agrologist (PAg) and it was felt that my licensed professional status might carry some weight with the Ministry of Forests, Range Management Branch. To give some context to the trip, let me provide the following history.

The Gang Ranch was originally established in 1863 as the Canadian Ranching Company by two Harper brothers, who came northward from California to the Cariboo goldfields. Over

the next 25 years they assembled a ranching "estate" of 38,000 ac (150 sq. km.). The Harpers sold out to English interests in 1891 and the operation continued as the Western Canadian Ranching Co. until 1952. The ranch then went through a series of owners before being purchased by Alsager Holdings in 1978. Alsanger went into receivership four years later. At its height, the Gang Ranch seemed to believe that it was "a law unto itself". It seriously mismanaged and degraded its own private rangelands and then proceeded to do the same to public rangelands under permit. It aggressively objected to any attempts to create conservation reserves on Crown rangelands. In one public hearing on the creation of the Junction Wildlife Management Area for the major California bighorn sheep population, Bob Munsey, the ranch manager during its declining years, stood up in a public meeting and proclaimed in an almost "Wild West" diatribe "Harold Mitchell, this country ain't big enough for both of us, and I ain't leavin'!" Only a few years later the Ranch went bankrupt and "Bobby" was down the road.

The approximately 90-mile round-trip was to be by horse-back for 10 days, and our "host" was the legendary B.C. Guide-Outfitter Edward Duncan "Chilco" Choate. His licensed guiding territory was based at Gaspard Lake and extended to the eastern slopes of the Coast Range west of Tatlayoko Lake. Chilco had been a vocal critic of the Gang Ranch for years, because of both its destructive range management practices and its indiscriminate and illegal killing of bears, wolves and other predators with no evidence of livestock predation. He was subject to constant harassment by ranch cowboys who regularly "shadowed" him and his clients. His cabins were often vandalized and, on several occasions in late fall, sharpened metal spikes were driven into the mud of his access road in the evening, to freeze solid overnight, and puncture his tires when he returned with clients the next morning.

The area we were to inspect consisted of three sub-alpine basins on the eastern slopes of the Chilcotin Mountains. These areas were under permit by the provincial Range Management Branch with two primary conditions because of their inherent sensitivity: first, only one basin could be grazed each year, on a three-year rotation; and second, there was a strict limit to the number of animals that could be grazed each year. These conditions had been advertised in

local newspapers and thus were public knowledge. The results of our inspection were pretty damning. We found significant numbers of cattle in each of the three basins, and total numbers significantly exceeded what was allowed in the permit. There had been no attempt to manage the distribution of grazing and many areas of serious soil disturbance had occurred from over-use, particularly around stream courses and subalpine tarns. I recorded our observations with photographs in all three basins in anticipation of a meeting with the Director of Range Management in Victoria. I met with the Director on my return to Victoria and the grazing permits were immediately cancelled. He asked whether I knew the reason why regional Range Management Branch staff had not dealt with the situation, and I replied that I did not.

> **In Memorium**: This trip was my last real experience with Harold Mitchell and his assistant Wes Prediger. Tragically, they were both killed in a helicopter crash while carrying out aerial wildlife surveys in 1979 – a huge loss to wildlife conservation in the Province.

The Fish and Wildlife people were a privilege to work with – supremely professional, dedicated, passionate, and fearless – and I fully expected to work there for the rest of my Government career. However, in late 1978 I was asked out for coffee by one of the Assistant Directors of the Environment and Land Use Committee Secretariat and invited to apply for two positions – one a biologist and the other a planning officer - that were about to be advertised. He asked me to apply for both positions, since it would improve my chances. I did, and I was mildly embarrassed (and, I admit, a bit chuffed) to be told that I had won both competitions. I was asked if I would please accept the Biologist position because the #2 in the competition for Planning Officer position was by far the next best candidate. In any case, I was told there would be little practical difference in the duties of the two positions in the organization.

1979-80. **Environment and Land Use Committee Secretariat** -
Resource Planning Officer

To understand why I was so excited at this new opportunity, let me take a moment to explain the organization. The Environment and Land Use Committee of Cabinet was established by the Social Credit government under the ELU Act in 1971 with two stated functions: 1. to increase public awareness of environmental issues; and 2. to ensure that environmental concerns were fully considered in land and resource use decisions.

The Committee was also empowered under the act to conduct public hearings and enquiries. In 1973 the newly elected New Democratic Party government created a staff Secretariat to the Ministerial Committee to "recommend solutions to resource conflicts by coordinating interdepartmental and integrated land use analyses and studies".

It was the first time in B.C. history that a permanent staff organization had been set up to serve a Committee of Cabinet. The Secretariat consisted of three units: Resource Planning,

Special Projects, and Resource Analysis. Resource Planning included the coordination of on-going environmental and social impact assessment processes (primarily in the mining and energy sectors) and "one-off " adjudications of land and resource use conflicts. Special Projects dealt with comprehensive studies of specific, high profile, public and private sector infrastructure projects, usually requiring significant socio-economic and feasibility analyses. Resource Analysis provided the biophysical and social inventories and assessments necessary (usually on large geographic areas) to support the activities of the other two units. Secretariat staff came from a wide array of backgrounds: professional planners, engineers, economists, foresters, ecologists, agronomists, social scientists, soil and geo-scientists, and geographers.

In anticipation of major predicted expansions of the mining industry, the Secretariat had been directed by the Cabinet Committee in 1973 to develop, and ultimately coordinate implementation of, comprehensive environmental and social impact assessment and management processes for the coal and metal mining sectors and major energy and infrastructure projects. In addition, the Resource Analysis Unit was directed to expand existing resource inventories in the southeast coal block and to initiate a major new resource inventory program in the minimally-studied northeast to provide a basis for future impact assessments.

I joined the Resource Planning Unit in early 1979 during the predicted coal mining expansion in both the northeast and southeast. Ray Crook, who was to become one of my closest colleagues, had joined the Resource Analysis Unit a few years earlier to coordinate the resource inventories in the northeast coal block. He was now transferred to the Resource Planning Unit where he and I would jointly coordinate project reviews under the Coal Mine Development Guidelines for the next two years; me in the southeast and he in the northeast. Also during this time, I coordinated two other resource/land use studies involving:

1. Resolution of logging/mountain caribou conflicts in the Central Interior focusing on the last viable mountain caribou population in B.C. shared between Wells Gray Provincial Park and the adjacent Raft-North Thompson Timber Supply Area; and
2. Land-use decisions on residual lands in the Kootenay Region that had been expropriated by B.C. Hydro for reservoir storage for downstream flood control and hydroelectric power generation under the Canada/U.S. Columbia Basin agreement.

It was a busy and exciting time and a whole new experience for me to be so close to the political decision-making process.

In mid-1979, the Assistant Director of Resource Planning elected to take a seven-month sabbatical in the U.K. This was an opportunity available to senior managers, who could bank unused holiday and sick-leave time over a ten-year period, and use this accumulated time to undertake approved professional studies and research into experiences in other jurisdictions that might have application to B.C. He elected to study river basin planning in England and Scotland. Over the period of his absence his duties were assumed by the Assistant Director of Special Projects. Surprisingly, on his return in 1980 he did not come back to the Secretariat but began working for the Ministry of Environment on a sub-regional "strategic"

environmental planning process based on major river basins, and this was eventually to have a significant implications for the Secretariat.

In the summer of 1980 I decided to take Kirsty and Fiona to Calgary by train for the Calgary Stampede. We had visited my parents on trips from Fernie when the children were smaller but now at 10 and 7 years I felt I had a real opportunity to show them the city I grew up in. Besides the Stampede we visited the Calgary Zoo, Heritage Park and made a day trip to Banff. One evening after dinner, my dad asked me "casually" if I wanted to go for a walk. This was usually my Dad's way of breaking bad news so I quickly agreed. However, on the walk it seemed that he was really evading whatever was on his mind. Finally I asked him outright what was wrong. He stunned me by blurting out "Johnny, your mom and I are so worried. You just don't seem to be able to hold down a job!" I was so stunned that I didn't quite know how to respond. Here was someone who'd worked essentially for the same organization his whole career - something that was quite common in the post 1930's depression and WW2 generation. How could I get across to him that I was interested in continually expanding my experience; that I didn't want to be a narrow specialist (there were already enough of those); I wanted to be able to integrate and synthesize between specialties; and that, in the world I had to work in, it was important to establish networks of complementary professionals? I tried to explain all this in the limited time I had on this trip but I'm not sure I ever got across to him.

As previously mentioned, the Secretariat's Assistant Director of Resource Planning returned to government from sabbatical in mid-1980, to a new position of Director of Strategic Planning in the Ministry of Environment. This planning process was to be based on major river basins, with the intention of integrating the management activities of the various Branches of the Ministry and providing a basis for decisions on priorities and budget allocations. One problem with this was that, while river basins are a logical planning unit for land use, resident fisheries, and water quality, they don't work particularly well for things that are more "mobile" like wildlife and migratory fisheries or air and water quality. Nevertheless, the new Director established an interdisciplinary Ministry team to develop the new planning process and introduce it to staff in the eight regions.

In 1981, the ELUC Deputy Ministers' Committee, under the leadership of the Deputy Minister of Environment, convinced the politicians that the Ministries "were big boys and girls now, and could be trusted to play well together in the resource management sand box". Thus, it was argued, the Secretariat was no longer needed and it was disbanded. In my opinion, this was incredibly unrealistic, but was a predictable outcome of the tendency of the Secretariat Director to by-pass the Deputy Ministers' Committee and report directly to the Ministers. I believe that had he worked in partnership, or even closer consultation, with the Deputies this might never have happened.

There also appeared to be an assumption that the Secretariat staff would simply be absorbed into the Ministry of Environment. This turned out to be a very unrealistic expectation given the bitterness that many of the staff felt over what they believed was the Ministry's role in the

Secretariat's demise. Some of the staff opted to leave Government for the consulting industry, but most went to the Deputies of the Ministries they had worked most closely with on projects, and negotiated positions with them: primarily in Forestry, Energy and Mines, Transportation and Highways, Lands and Parks, Municipal Affairs, the Agricultural Land Commission and Aboriginal Affairs. When "the dust had settled", Lynn Bailey and I were the only staff to voluntarily join the Ministry of Environment.

In the last month before we were officially disbanded, staff came together to produce the equivalent of a very cheeky high school yearbook, entitled "THE DEVIL"S CLUB: A Fond Look Backwards at the ELUC School of Hard Knocks by the Graduating Class of 1980". We were all very pleased when the Head Librarian of the Government Legislative Library asked for three copies to be permanently placed in the library's collection.

1981- 88 **Planning and Assessment Branch** - Manager, Planning and Mine Impact Review Unit

In mid 1981 I was appointed Manager of Strategic Environmental Planning for the Ministry of Environment, to implement the planning process proposed by the ex- Director of Resource Planning in the Secretariat (see above), who was now, once again, my boss. We had no staff, but I was assigned 14 vacant positions to fill by competition. I elected to establish 6 positions in Victoria - 2 senior planning officers, 3 planning officers and 1 research officer. I felt that there was no way that we could function without providing staff support to regions, so I offered the 8 Regional Directors one planning/research officer position each that they could fill themselves by competition. I carried out a competition in Victoria to fill the six positions, and hired Norm Ringstad and Jackie Hamilton as senior planning officers; Linda Hannah, Brian Turner, and Lynn Bailey as Planning Officers; and Cathy Carr as Research Officer - all of whom became lifelong friends, and Lynn much more.

In the late spring of 1982 the Government announced a program of significant budget "claw-backs" and forced staff reductions. The most vulnerable staff positions were those most recently established with staff who were new to Government, and the Ministry Executive elected to cancel all of the eight regional planning officer positions that I had made available to Regional Directors (some of which, thankfully, had not yet been filled). With other staff reductions in headquarters and regions, the regional strategic planning program that had been announced with such fanfare less than two years before was no longer feasible and we would have to re-think both the organization and the delivery of our services to the Ministry.

One of the first steps taken that affected us was the integration of the Ministry's environmental planning and environmental assessment functions into a single Planning and Assessment Branch under our, now much-diminished, Executive Director. The manager of mining assessments took this opportunity to retire and his responsibilities and his excellent staff person, Dave Parsons, were transferred to me.

The responsibilities of my new unit were: 1) To assist Ministry Program Directors to develop provincial-level program management statements for Water, Waste, Fish, Wildlife, Air Resources and Environmental Enforcement; 2) To prepare Ministry position statements on major coal and metal mine developments for the province's two mine development review processes; and 3) To coordinate Ministry submissions to inter-agency planning processes, such as local government official settlement plans, forest management plans, and Crown land use and foreshore plans. In relation to task # 2, I represented the Ministry on cooperative industry/government technical working groups dealing with issues of overburden dump and tailings lagoon stability, acid mine drainage, and land reclamation.

My major time commitment during this decade, particularly after Dave Parsons was seriously injured in an automobile accident in 1984, were the two mine development review processes (the coal and metal mines processes) which were subsequently combined for consistency into a single Mine Development Review Process. I was fortunate that Ray Crook was my counterpart in the Ministry of Mines and we worked really well together as a team to administer the process. It became one of the busiest times in decades for both the coal and metal mining sectors, with major expansions in both the southeast and northeast coal blocks, and significant new metal mining activity in the Skeena/Nass region in the northwest. Over the eight years from 1981 to 1988 we processed 31 submissions on coal projects and 68 submissions on metal projects. In retrospect I have to complement both headquarters and regional staff of the Ministry on the high quality and timeliness of their contributions to the processes. I also have to acknowledge the contributions of several principled environmental consultants who "blew the whistle" on companies that were providing false or misleading information in their submissions to the process.

Very early on we recognized that the two mine development review processes would require major modifications if they were to deal efficiently with the expanded workload. Essentially, as originally conceived, they were linear, one-track, one-size-fits-all processes based on the Federal Government's EIA process. What we proposed for approval by the Ministerial ELUC were processes that would be much more flexible and incorporate the following changes to deal with projects of different sizes and potential implications:

- Entry into to the process would be a simple conceptual project design or "Prospectus" that would be used to scope management issues, focus subsequent data collection and review, and steer the project to an appropriate review path;
- Review of the prospectus and each subsequent report would serve as a basis for project-specific, "tailor-made" terms of reference and requirements for the next submission;
- Two initial review paths were proposed on the basis of the prospectus review, depending on project complexity and anticipated impacts: 1. A fast-track for simple projects directly to legal permits and licences, and 2. A requirement for a Stage I report containing a conceptual project design, an initial prediction and quantification of impacts, and proposed impact mitigation commitments;
- On the basis of the Stage I report, three decisions were possible: 1. Reject the project; 2. Approve the project subject to a Stage II report with a detailed project design and programs of impact management; 3. Defer a decision pending substantial project

design modifications and more detailed impact management commitments. The Stage II approval allowed for the coordinated issuing of the permits and licenses needed to begin operations, which would occur at Stage III.
- The final Stage III of the process would be a coordinated granting of the various legal permits and licences required for the company to implement the project which, if government and proponent had done their jobs effectively, should be straight-forward and timely.

The proposed processes were accepted by the ELUC, and the Federal Government elected to participate in these new provincial processes as long as its regulatory requirements were satisfied. Even the mining industry grudgingly accepted (they would never be "happy" with any government oversight) the new processes as a substantial improvement on the previous versions.

From 1983 to 1989, Ray Crook and I regularly gave presentations to conferences and meetings to explain and clarify the new processes. I was asked by Professor Murray Rankin of the University of Victoria Law Faculty to make an annual presentation to his course in environmental law. Professor Rankin subsequently arranged for the publication of my presentation in the Canadian Journal of Administrative Law and Practice. At some point our experience came to the attention of Dr. Shirley Conover of Dalhousie University who was the administrator of a Canadian Government foreign aid assistance program to the Government of Indonesia – Environmental Management Development in Indonesia (EMDI). A major component of this project was to improve the existing Indonesian environmental impact assessment process, which had been based on the linear process of the Canadian Federal Government in a previous phase of EMDI. Throughout the 1980s, Dr. Conover regularly brought Indonesian study tours to Canada and stopped in Victoria for sessions on the MDRP, and this was to have future personal implications.

1985 International Union for the Conservation Nature, Zambia.

In the spring of 1985 I took a six-week leave of absence for a short-term assignment with the International Union for the Conservation of Nature and Natural Resources (IUCN) in Zambia. The object was to give a workshop on environmental and social impact assessment to Zambian government staff, and advise the Government on the establishment of a development project assessment process in the government structure. Organizers of the workshop were an Englishman, John Horburry who I had previously met in Nairobi, and a Zimbabwean, Stephen Bass. We described the types of analyses common in ESIA processes and guided the participants through a retrospective analysis of three existing/proposed Zambian projects – a major dam, a copper mine, and a proposed agricultural irrigation project. The last project was being funded by the Bulgarian Government's aid agency and they had designed a pretty elaborate irrigation canal network. They carried out a present land use analysis of the area and an assessment of agricultural capability. Interestingly, the lands of highest agricultural capability almost exactly coincided with the areas that were currently being farmed by the (ecologically wise) peasant farmers. And then someone decided, belatedly, to do a ground-

water quality analysis to determine the potential for irrigation, and the mineral content of the water was so high that there was a significant danger of soil salinization under irrigation, so the project and the program was abandoned. Back home here in British Columbia, the efficiency and success of the ESIA processes depended on good will, professional competence, and constructive communication. There were always companies, consultants and sometimes even government officials, however, who tried to cut corners or subvert the system. Three examples of this perfidious behaviour will give a flavor of some of the less-than-positive issues we faced.

1. Denison Mines Ltd.'s Quintette Coal Project

The initial phases of the Northeast Coal Development from 1977 to 1984 were characterized by significant political interference in the development review processes. The Social Credit Minister of Industry and Small Business Don Phillips (nick-named "Old Leather Lungs" by his legislative colleagues because of his debating style) was MLA for the region and aggressively pushed the development even over the objections of his own Cabinet colleagues. The problem was that there was a limited and shrinking market for metallurgical coal, and the Southeast Coal Block, financed almost entirely by private-sector capital (with limited government investment), could more that satisfy market demand. So, in effect, we (as a Province) were setting ourselves up in competition with ourselves – Really Stupid!!

Denison Mines Ltd. had been primarily a uranium producer operating in the Athabasca Basin, and had no previous experience in coal mining or in sedimentary geological formations. The Denison "Quintette Coal Project" passed through the compromised MDRP in 1982-83 and began production in 1984. One of the comments in the MDRP review by Government coal geologists was a caution that the Company did not appear to have done enough geological drilling to properly define its coal formations. The Company dismissed this advice as being the view of overly-cautious Government bureaucrats, but by early 1985 there were very serious problems emerging. It turned out that the concerns of the government geologists were warranted because as mining progressed it was discovered that the coal seams were dipping away from the surface at an accelerating rate, resulting in the production of far more overburden waste than could be disposed of safely. When dumping excavated materials, it is necessary to rotate use of the dumping platforms to allow them a period of stabilization before returning to the same area, but the very constrained mining area did not allow this. There were several slope failures that involved heavy equipment losses, operator injuries and two deaths. One massive slide destroyed the mine's water treatment sedimentation ponds in the valley below.

In March 1985 Bill Moore, Denison's Vice President, asked for a meeting with Ray Crook and I, at which he laid out the Company's intention to develop a new surface mining operation on the property. He demanded that approval be given by the MDPR, and that all necessary permits and licenses be in place no later than the end of September. We explained

to him that even if the Company had a full mine plan prepared for immediate submission (unlikely!!) such a time-line was not realistic. He looked at us and said, "Don't give me excuses! Just make it happen!!" We felt we had no option but to consult the Minister for advice. Bruce Strachan was our new Environment Minister, Chair of the ELUC, and MLA for northeastern B.C. (replacing "Old Leather Lungs" who had retired to Australia). Bruce Strachan was the best Minister I ever served under. He was smart, principled and decisive, with a good sense of due process, and was extremely respectful of staff. He listened to our description of the situation and said (in effect) "They played fast and loose with us once, they won't do it twice. I want you to go back to Mr. Moore and tell him that this time they will follow the process precisely. Tell him the timeline will depend entirely on the Company's ability to submit competent, acceptable and timely design reports". We arranged a meeting with Mr. Moore and relayed the Minister's directive. He was completely outraged and shouted, with considerable venom, "I hold the two of you personally responsible for this and I will get your jobs if it's the last thing I do!!" He was never able to carry out this threat to Ray, but as I'll mention later, he eventually did for me. The new pit was approved in mid-1986 but by 1991 serious production problems had developed, and Teck Corporation took over operation from Denison until the mine was finally closed in 2000.

2. Johnny Mountain Mine, Skyline Gold Corporation

Johnny (no connection) Mountain was a proposed gold/silver mine in the Iskut area of the Stikine. The streams and rivers of the area have very high fisheries values and are trans-boundary (flowing into the Alaska panhandle) so water quality was a significant international concern. The most common method of separating gold/silver ore from the rock in which it occurs is to treat it in a cyanide solution to dissolve the metals, which are subsequently recovered by chemical precipitation. This, however, leaves you with a cyanide "soup" (which may contain other nasties like arsenic depending on the chemistry of the ore body) that has to be treated before in can be released to the environment. Cyanide can degrade naturally through exposure to sunlight, oxygen and warm temperatures but this is a very slow process (particularly in cold, rainy climates) and requires large holding ponds. The artificial treatment used to speed up the process utilizes sulphur dioxide as a reagent and is an important Canadian development, now used worldwide, known as the INCO (International Nickel Co.) SO_2 Process.

Quite early on the Company's consultants approached us with a request. They proposed to use the INCO process to deal with residual cyanide but, because there was a major waterfall about 5 km below the minesite that precluded fish passage to the upper watershed, requested if we could approve the application of water quality standards (particularly cyanide) for fisheries protection at the bottom of the falls. We told them that this was not usual practice, and in any case would have to be a decision by the Federal Department of Fisheries and Oceans. I agreed to contact the "Feds" for a decision. Our federal contact reinforced that this was not the usual policy, but they would allow the Company to make the case through its MDRP submission.

When we received the Company's Stage 1 report we felt there was something not quite right with the water quality analysis – it seemed just a little too "convenient". So we contacted Keith Fergusson our mining expert contact in Environment Canada, and he agreed to send the information to INCO for advice. INCO's response was that even its own technical staff, who had been involved in development of the process from its inception, could not consistently meet the degree of cyanide removal that the Company was proposing. When we discussed this with the Company's consultants, their reaction took our breath away – it was pure "chutzpah" (a wonderful Yiddish word that has the connotation of "cheeky audacity"). Their response could be paraphrased as "Dang!! Okay you caught us out on this; you guys are smarter than we gave you credit for". We were not amused! They went "back to the drawing board" and re-designed a much bigger tailings pond and a larger cyanide destruction facility. The mine began production in1988 and operated intermittently for a total of 24 months before ceasing production in 1993 – with no remediation and closure plan as "required" by the Mines Ministry. An independent aerial inspection of the property in 2011 revealed derelict buildings, rusting, abandoned machinery, and uncontrolled acid mine drainage from the underground workings. However the mine was in that "brownfield" regulatory limbo of "not in production but not officially abandoned" and the Ministry of Mines had not yet taken any action on cleanup and decommissioning. At the time we shared the results of our review with the Mines Ministry, but I have no idea what the current situation is.

3. Golden Bear Mine, Golden Bear Operating Company and Homestake Minerals

The Golden Bear mine was located southwest of Dease Lake off Highway 37. The major river system associated with the mining operation and, in particular, its proposed access road is the Tahltan, which is one of the major sockeye producers in the Stikine system. The project entered the MDRP in 1986 and proposed a two-staged submission: first, an initial report to be filed in April 1987 with a conceptual mine plan and an examination of possible alternatives for an anticipated +/- 150 km access road to the mine site; and second, a final, comprehensive report to be filed in October 1987 which would be the basis for its application for MDRP approval.

The first stage report was filed in April and it soon became apparent that the Company had really considered only one road alignment - a long and very indirect route from the Dease Lake/Telegraph Creek Road via the Little Tahltan River and the Hackett River (part of the Taku system and thus an international river requiring referral to the International Joint Commission IJC) to the minesite. It seemed obvious from the beginning that the Company was proposing a route that would provide eventual access to a number of its promising (but far from proven) mineral prospects in the area; in short, a regional resource access road **that was contrary to existing government policy without a supporting regional resource/economic analysis.** The initial alignment of the road was along the Little Tahltan River, which flows through glacial soil deposits of inter-bedded silts and sands that were very unstable if disturbed. The Company had already undertaken some initial unauthorized "survey (read pre-construction)" work on the Little Tahltan that resulted in serious erosion and stream contamination. At the time it was issued a "stop work" order and fined by Federal Fisheries. The Tahltan Band Council objected to the proposed road alignment and indicated

that they could suggest a more appropriate alternate route. The Company was adamant that it wanted its preferred route, but we insisted on a full examination of alternatives in the final October report.On an unrelated visit to Smithers during late summer Ray Crook and I were approached by Dave Hatler, the former B.C. government Regional Wildlife Biologist. As a private consultant, Dave had done most of the wildlife surveys for the Company's primary consultant and wanted to give us a "heads-up" on what he described would be a "bomb shell" in the final report. He had carried out aerial wildlife surveys the previous October and discovered the largest concentration of grizzly bears east of the coastal estuaries, keying in to a major run of spawning salmon on the Hackett River. The proposed road alignment would traverse a considerable length of the Hackett a few hundred meters above the floodplain posing threats both to the river and its salmon populations through construction, and to the grizzly bears from the disturbance of construction, vehicle traffic and potential poaching. The important thing here was that this information had been presented to the Company the previous autumn and had been deliberately withheld from its April report. In view of this new information, and the Company's duplicity in withholding it until so late in the review process, the MDRP formally rejected this road proposal. In addition, the Company had done such a cursory job of assessing other access options that there was really nothing further to review. This unprecedented MDRP decision was supported by the Ministry of Mines, the Ministry of Environment, the Federal Departments of Environment and Fisheries and Oceans, the Tahltan Tribal Council, the B.C. Wildlife Federation, and, remarkably, the B.C. Mining Association.

Shortly after this decision, my Assistant Deputy Minister informed me that the Company was requesting a meeting with him and our (brand new) Deputy Minister to discuss our rejection of the road. I asked him when the meeting would be and he told me "this afternoon but the company has requested that you not be present". I asked if he and the Deputy would like a briefing before the meeting and he said no, he felt "up to speed" and anyway they'd like to "keep an open mind".

When the meeting broke up, he told me that he and the Deputy had agreed to withdraw our objection to the company's proposed road alignment. I don't think I have ever been so angry, and said some things - as I recall employing terms like "gutless", "incompetent" and "unprincipled" - that probably should have got me fired. I said that every submission I made to the MDRP was prepared with full participation of our Program and Regional staff, was subjected to a thorough review by both (and therefore represented a Ministry consensus), before being submitted to, and accepted by, a politically-sanctioned, inter-Ministry review process. I told him that if he wished to overturn our ministry consensus he should write such a letter to the MDRP steering committee, after full consultation with Ministry staff. I reminded him that all submissions accepted by the MDRP Steering Committee became part of the "public record" and his letter had better have a very credible explanation for why we were now changing our position. He looked at me, with a hint of panic in his eyes, and blurted out "On the public record, when did that happen!?!" I took great joy, and it almost made the entire episode worth while, to be able to say, "When you prepared the original versions of the two mine review processes. You included this provision on the principle of "public transparency."

I then told him to phone Ray Crook (who I'd fore-warned) and listened with great glee as Ray "went up one side and down the other" in a diatribe (Ray, when angry/excited, didn't need to be put on speaker phone, you could hear every word across the room coming out of the hand-held receiver): "My deputy warned me not to get out in front of Environment! He said you were effectively gutless and couldn't be trusted to keep your word!! Our position is now on the public record and so YOU better have a really good reason for jeopardizing an unprecedented consensus on this issue", etcetera, etcetera, etcetera. Throughout the call my boss sank lower and lower in his chair. When it was over and I was leaving I remarked, "I think this was yet another of your ''less than finest hours''. The next morning, after (what I was told was) a rather tense discussion with the Deputy, he had to phone the company to inform them that our objection to the road alignment would stand.

The best result of this debacle was that Golden Bear Operating Company folded and the project was taken over by North American Metals and Pelly Construction. Pelly Construction immediately formed a partnership with the newly established Tahltan Development Corporation to design, construct and maintain a new access road. The new road relied heavily on the Tahltan's local knowledge to select a new route that was shorter, less environmentally sensitive, and relied on rain shadow areas that would receive much less winter snow and therefore, be more reliable and less expensive to maintain winter access.

The final "really good news" part of this story is that when the mine closed in 2004 the partnership of Pelly Construction and the Tahltan Development Corporation received a citation from an international mining association in "recognition of outstanding achievement in mine reclamation and de-commissioning".

As a "somewhat amusing" postscript to this time in my life, one Sunday morning in early 1987 I went into the office to catch up on some work. I walked into my office, to surprise my boss who was a bit hard of hearing, rifling through my desk and filing cabinet. I asked him if I could help him find something and, after some prevarication, he explained that the Ministry had been asked to present a paper on our Mine Development Review Process to a conference in Brisbane, Australia "Mining and the Environment: A Professional Approach", and that he had decided to make the presentation. I was stunned!! I asked him how he intended to do this when he'd had minimal involvement in the mine development review process over the previous 10 years. After some "tense" discussion it was agreed that I would do the presentation on the evolution of the MDRP and he would describe the existing and potential linkages to broader environmental, social and land-use planning processes. My presentation was entitled "British Columbia's Mine Development Review Process: A Decade of Trial and Evolution in Environmental Impact Assessment". We turned the first class air ticket provided by the conference into two regular air tickets, and Lynn and I bought a third ticket so that we could take the opportunity to visit "Oz" together. After the conference we headed north to Cairns (pronounced Cannes) and Port Douglas to see REALLY big crocodiles, spectacular coral formations and tropical fish on the Great Barrier Reef and, to Lynn's great joy, REALLY big cockroaches in our hotel shower – a preview of things to come in Indonesia.

1989 **Sustainable Development and Corporate Policy** - Director

In early 1989, I was promoted to "Director of Sustainable Development and Corporate Policy", one of four branches in the new Policy and Planning Division of the Ministry, together with Environmental Assessment, Economic Analyses, and Environmental Planning.

My immediate terms-of-reference for this new position were to:

- Advise the Ministry Executive on the implications to B.C. of "Our Common Future" the report of the World Commission on Environment and Development (the Brundtland Commission), and the Report of the Canadian Government's National Task Force on Environment and Economy;
- Analyze and develop environmental policy and recommend new corporate direction for the Ministry; and
- Begin the development of a State-of-Environment reporting system for B.C.

However, the very first assignment I was given was to work with the Assistant Deputy Minister of Administration on a short-term secondment to the Premier's Office. There were hints of an upcoming provincial election sometime in the next few years and the Premier of the day, Bill Vander Zalm, was not perceived as either environmentally "friendly" or "particularly knowledgeable". My task was to try to "paint him green". I spent six weeks preparing briefing notes on the most important current environmental issues which, from my perspective, included: global climate change; air quality; food supply and safety; biodiversity conservation and management, water quality and quantity; and special and solid waste management (including disposal, recycling and resource recovery).

On my return to the Ministry, I spent the next eight months working on three major initiatives:

1. Preparation of a policy discussion paper on future directions for the Ministry of Environment, which I titled ENVIRONMENT 2001: Towards a Vision for The Ministry in the New Century.

My instruction from the Ministry Executive on this assignment was to "be controversial and challenge current thinking in the Ministry". So, reluctantly (not!) I tried. I started with an introductory statement:

> "The Ministry lacks a commonly-accepted, binding philosophy that encourages interdepartmental integration. What could have become an exciting blend of complementary disciplines pursuing a common purpose, has largely remained a collection of regulators, enforcers, enhancers, protectors, promoters, researchers, biologists and engineers, working in isolation, and sometimes even at cross purposes."

> "There is a strong perception in other agencies, in industry, and in the general public that the Ministry is capricious and inconsistent. It sets environmental standards without explaining the underlying rational, and then doesn't enforce them with any consistency. It insists on strict standards of environmental assessment for many industrial projects, but doesn't subject its own activities - such as river channelization, flood proofing, and lake poisoning for exotic sports-fish introductions – to anything like the same degree of scrutiny and supervision. Finally, and perhaps most important from a public perspective, the Ministry seems to be very selective in the 'components' of the environment it deems worthy of its management attention."

The response to this from one Assistant Deputy Minister was "Oh my God, we can't say that!!!" So much for being "controversial" and "challenging current thinking".

I expressed the view that "no other ideal offers the Ministry as much guidance as does the concept of sustainable development advanced by the U.N. World Commission on Environment and Development." I went on to define the underlying principles of sustainable development and: 1. assess the Ministry's "mission statement" and some of the philosophical questions it raised within the context of sustainability; 2. identify some of the major environmental issues that the Ministry would have to address over the coming decade,; and 3. provide a sequential framework for Ministry action and evolution. I got very positive feedback from line staff– one of the nicest was from a regional water engineer in the Okanagan who sent me a one-line message "Wow, I'd sure like to work in a Ministry like this". The response from the Ministry Executive was a little more "muted".

2. Coordination of a Ministry working group on environmental compliance and enforcement, and preparation of a draft report submitted to the Ministry Executive in January 1990, entitled "A Strategy for Regulatory Compliance and Improved Performance in the Management of Environmental Quality", with recommendations for better performance, coordination and consistency.

3. Organization, with staff person Linda Hannah (who was to take over this project), of a Federal/Provincial workshop on State of Environment Reporting, held in September, that established terms-of-reference and time-lines for the preparation of a comprehensive British Columbia State of Environment Report to be published in 1992.

In late 1989 arrangements were formalized for Lynn and I to be seconded from the B.C. Ministry of Environment for two and a half years to work on a Canadian International Development Agency (CIDA) project in Indonesia. This project is discussed in detail in Chapter 15.

CHAPTER 13. LIFE CHANGES: 1980 - 1989

I'll do a little back-tracking here to deal with some fundamental changes to my personal life that would have s significant influence on my subsequent professional career. The last six years of the 1970's had been a continuous manic/depression "roller coaster" for my wife Mary who had suffered regular bi-polar psychiatric problems for much of her life. She hated her medications and I couldn't blame her because there were several very unpleasant side effects. The consequences of not taking her medications, however, were really serious, with irrational manic highs mirrored by deep, occasionally semi-suicidal depressions and hospitalizations. By early 1981, I had enough and told her very firmly that I could not live with her any longer if she didn't commit to following her medication regime and remain under consistent psychiatric care. She said nothing at the time but a couple of days later I came home to find she had packed up everything she wanted to take and moved out. The children stayed with me, and Mary visited regularly. Over the fall and winter we negotiated and concluded a legal separation agreement with a timetable for a final divorce. I agreed to take full financial responsibility for the children, and to support her return to school for whatever training she would need to support herself. We negotiated and concluded a legal separation agreement with a timetable for a final divorce. She indicated that she would like to remain in the house and that her parents had agreed to give her the money to buy out my share. In the spring, Mary informed me that she had spoken to the children's school and arranged to take the kids out of classes in early June for a trip to England to visit her aunts and cousins for the summer. In the fall she rented an apartment for a short term while I got the house ready for her occupation, she started job training in secretarial and office administration skills, and we began to share the children on a regular schedule.

Just after New Years 1982, Lynn Bailey and I started cautiously dating. We made a trip to Vancouver to talk to her parents, Byron and Diana, and broke the news. We told them that we recognized the complications (age difference, divorcee, two children from the previous marriage). I told them that it was early days in our relationship and that they shouldn't be overly concerned (yet) - we'd tell them when they might begin to worry if they were so inclined. We took things slowly and quietly over the course of the spring, allowing Kirsty and Fiona to get to know Lynn a little better until they left for England with Mary in June. By the end of the summer we had become engaged and we were married on August 5th, 1983. Our work colleagues were very supportive.

When we first met, Lynn was having some physical problems that had potentially significant implications for her ability to conceive a child. We were told that these problems would get progressively worse and thus should plan for a pregnancy as soon as possible. It had to be preceded by initial surgery, which was done in early1994. This surgery was successful and Rachel Bailey Dick was born on October 4th, 1985.

In December of 1988, I was contacted by Dr. Shirley Conover of Dalhousie University, and asked if I would be interested in the position of project manager of the Environmental Management Development Project in Indonesia (EMDI). She asked that, if I was interested,

would I be able to come to Halifax in late January for an interview. She explained that there was a standing agreement between the Federal and Provincial Governments that Provincial employees could be made available on secondment to Federal foreign aide programs. The Federal government would pay an equivalent salary and contribute to pension and other benefits for the period of the contract. I explained that our Division within the Ministry was currently in a state of re-organization and, since I had no idea where I would be placed, I'd be happy to consider the EMDI position. I did, however have a condition, and that was that with Lynn and I having juggled two careers and three children for the previous five years, I was not prepared to see her put her career on hold. There would have to be a suitable job arranged for her, presumably (to avoid conflict of interest) in another international aide program. Dr. Conover said that, with Lynn's experience, she did not anticipate that this would be any problem and so I agreed to an interview in January.

I flew to Halifax and had my first experience of Maritime winter freezing-rain. I felt the interview went well and within a few days of my return to Victoria I was told that I had won the competition, negotiations with the B.C. Government would begin soon and they would get back in touch. About three weeks later I was phoned to say that the Indonesians wanted to advance the schedule significantly and would it be possible to be "mobilized" as early as June? I asked what arrangements had been made for Lynn and they said nothing so far, but re-iterated that "with her experience she's certain to get a job". I said that I wasn't prepared to take that chance and, coupled with the logistical problems of the expedited time-line, I regretfully couldn't accept the job. In retrospect all of this was VERY fortunate for me, given the constant headaches that Gerry Glazier, our eventual Project Manager, had dealing with the incredibly hopeless and demanding Dalhousie University administration

I assumed "that was that', but in June I was again contacted by Dr. Conover who said "Surprise!! The Indonesians want EMDI to supply two EIA advisors, **one of whom must be a woman"**. Both of the EIA advisors in the earlier stages of EMDI had been male, and Indonesian husbands were apparently concerned about the optics of their wives making business trips alone with these male foreigners. The added advantage of this new plan from our perspective was that the jobs would start in early 1990, which would allow much more time for negotiations with the B.C. Government and for us to get our own affairs in order. Dr. Conover also informed us that, all other things falling into place, we would be flown to Jakarta in the fall for an introductory meeting with senior Indonesian staff and to get an idea of housing and school arrangements. In late summer the federal and provincial governments reached an agreement on our secondment. The next step was for the Indonesians and us to meet and approve of one another.

Plans were made for us to go to Jakarta in late September for a week. We took off from Vancouver airport for our "look see". As we rolled down the runway, Lynn, who had only ever been off the continent before to go to Hawaii (twice) and Australia (once), looked me in the eye and said "I hope you realize that I may not want to do this". The first leg of our journey was a 12-hour flight to Hong Kong (see photo above) where we arrived in the evening and had the next day as a layover. The next morning we arose early and walked around the hotel neighbourhood. We lucked into a multi-storied food store where the array of

food items was simply astonishing. Lower floors had tanks of live shell fish and finfish of all sizes and varieties (plus some reptiles and amphibians), one whole floor was devoted entirely to a huge array of piles of dried spices, several of the middle floors sold tropical and temperate fruits and vegetables, and the top two floors, serviced by an elevator, was the meat store/butcher shop with a great variety of dead animals and animal parts on display. Just as we arrived on the top floor the elevator door opened and a dolly was wheeled out carrying the largest pig carcass we'd ever seen. At this point Lynn had had enough of the smell of death, so we headed off for more conventional tourist attractions like Victoria Peak and Hong Kong Harbour.

Next day (Sunday) we caught an early flight to Jakarta landing around mid-day. There was a new modern airport under construction, but for our introduction to Indonesia we were required to experience the old airport – hot, squalid, shabby, crowded, and disorganized chaos. We collected our baggage, somehow got a taxi, and proceeded to our hotel for a really pleasant surprise – EMDI had booked us into the Hotel Borabudur, one of Jakarta's most luxurious hotels. We spent the rest of the day snoozing and hanging out at the pool, before being picked up and driven to an evening reception to introduce us to our new EMDI colleagues and Senior Government staff (I still can't understand how we made a favourable impression in our semi-comatose, jet-lagged condition).

Jakarta

The next three days were a whirlwind marathon of meetings, first with CIDA officials at the Embassy, then senior staff of the Ministry of Population and Environment (KLH) for an introduction to the Indonesian EIA process (AMDAL/SEMDAL), brief introductions to staff of the World Bank and Asia Development Bank for their views on the EIA process, and finally visits to the major sectoral Government Departments responsible for EIA implementation.

We returned home and began preparing for our new adventure, finishing or handing-off projects at work, arranging to rent-out our house, packing and getting ready for Christmas - all before going to Ottawa for our compulsory CIDA "orientation" in January, which included Fiona and Rachel. We had the pleasure of attending the CIDA orientation with Clifton and Nicki Potter and their sons Greg and Brian, who would join us in EMDI and become some of our closest friends. Otherwise the orientation was just a little strange. Most of the other participants were prairie wheat farmers destined for CIDA-sponsored agricultural wheat projects in Tanzania, see below * under the Canadian Executive Service Overseas (CESO) or the "seniors' version" of CUSO. Most had never been outside of North America before and to say that they were "culturally unsophisticated" is an understatement.

The best parts of our orientation were some excellent presentations on the complex geography and cultural mosaics of Indonesia and its history and political system. After orientation we had a few weeks at home for final arrangements and family goodbyes before setting off on our grand adventure in late February.

*As a postscript here I'll paraphrase from a very influential book, "Lords Of Poverty" by Graham Hancock, a scathing critique of foreign aide programs that I will refer to again later: In reviewing the Canadian wheat projects in Tanzania, he commented the following:

> "In Canadian international development projects more than 80% of all development assistance is tied to the procurement of Canadian goods and services. In the 1970s CIDA gave its support to a scheme supposedly designed to help Tanzania become self-sufficient in wheat production. By the mid-1980's, however, with CAD$ 44 million spent it was apparent that the objective would never be achieved. Indeed, the only real beneficiaries of 15 years of work were Canadian companies who had supplied expensive farming equipment, spare parts and technical back-up (but little training in on-going maintenance), through the life of the program – but not beyond. Much of this equipment became useless, rusting 'hulks' in the Tanzanian bush. In reality, the capital-intensive production methods of western-style agribusiness could not be expected to translate to rural Africa – "particularly when delivered by people with no specialized experience in the methods of tropical agriculture, the characteristics of tropical soils, or the realities of small scale peasant food production". In Tanzania the failure to recognize the implications of these challenges, together with the myopic emphasis on securing benefits for Canadian firms, resulted in a wasteful, inappropriate and unsustainable project that was of no benefit whatsoever to the small-scale peasant farmers who were the 'backbone' of local food production."

CHAPTER 14. ENVIRONMENTAL MANAGEMENT DEVELOPMENT IN INDONESIA: 1990-1992

Indonesia is the land of acronyms because the language is so complex. For example, our new employer was the Ministry of Population and Environment (Kantor Menteri Negara Lingkungan Hidup). Given the mouthful this represents, it was shortened to KLH. I'll try to make the following as simple possible by defining, and then using, the acronyms.

Lynn and I were hired as environmental impact assessment advisors. The Indonesian ESIA consisted of a process for **proposed** development projects (AMDAL) and a process that would be retroactively applied to **existing** projects (SEMDAL). The acronym AMDAL stands for "Analyses Mengenai Dampak Lingkungan" and the acronym SEMDAL stands for "Studi Menganai Dampak Lingkungan". To give some background here, we were joining Phase III of EMDI. The environmental assessment processes (AMDAL/SEMDAL) were first proposed at Phase I and developed at Phase II.

The AMDAL process was based very closely on the Canadian Federal EIA process. As I've previously described, this process is essentially linear and one size fits all. It was administered and over-seen by KLH but implemented by individual sectoral departments (forestry, mines, petroleum resources, public works, agriculture, industry, transmigration, etc). Each of these sectors had an AMDAL committee co-chaired by a staff person from KLH. At the time of our arrival, the World Bank and its sister organization the Asia Development Bank had hired international advisors to work with each of these sectoral committees. Lynn and I approached senior staff of both Banks to see if they would support us in getting all these advisors together to ensure some consistency in AMDAL implementation, i.e. one consistent overall process that could be adapted to the needs of individual sectors. Both the Banks and the individual advisors reacted very positively to our suggestion and so we struck a committee that met at least bi-monthly over the next two years, introducing consistency and some quality control to the process.

The SEMDAL process could best be described as an impractical "pipe dream" by some academic Dalhousie University professors. The strength of an AMDAL process is that environmental impacts for proposed projects or even project expansions can be predicted based on past experience with the specific type of project and the particular values or sensitivities of the environment in which the project will be located. The project can then be designed and/or situated so as to **avoid or minimize** those negative impacts. For an existing project there is no need for an analysis or prediction of impacts, they will already be occurring and apparent from project monitoring or can be detected through simple project audits. The project can then be incrementally retro-fitted (as far as practical) to correct the specific problems identified or, if this is not possible and the environmental and social impacts are significant, simply shut down. The practical consideration here is that the SEMDAL process would have taken significant staff resources away from the AMDAL process for negligible benefits. We were able to work with other EMDI advisors to implement a simple project auditing process that could be targeted at projects known or suspected to be causing

significant environmental impacts, and operating permits amended to enforce project modifications or project closure. The SEMDAL process was subsequently abandoned.

One of the great advantages, both to us personally and to the AMDAL process, was the absolutely remarkable team of resource professionals assembled by Dalhousie University for EMDI. These included:

Gerry Glazier (wife Marlene): EMDI Director;
Susan Woods: Project Administrator and "Den Mother";
Brian Yates: a Dalhousie grad-student and project administrative assistant;
Bob Breeze (wife Nicole): Special and Hazardous Waste Management;
Clifton Potter (wife Nicki): Water Quality Management;
Cindy Jardine (husband Errol Billing): Special and Hazardous Wastes and Health Impacts (replaced Bob Breeze). Errol was an IT specialist and provided valuable and continuing IT support to the project;
Bob Byers (wife Heather): Water Quality Management (over-lapped with Clifton Potter);
Joe Kozak (wife Mary): Air Quality Management;
Tom Tomasic and Anne-Marie Mah: Marine Resource Management;
Howard Hume: Regulatory Enforcement;
Tony Whitten, Kate Monk, Katherine MacKinnon: Senior authors of the superlative eight-volume Ecology of Indonesia books;
Jack Ruitenbeek and Cindy Cartier: Environmental and Natural Resource Economics;
Craig Taylor and Carolyn Vandersluys: Land Use and Natural Resource Planning.
Ani Kartikasari: Librarian/Archivist and report publisher; and
Tom Dafoe: Public Works ESIA (Tom was one of the World Bank/Asia Development Bank sectoral ESIA appointments to other Ministries. Being Canadian, I am adding him as an honorary member of EMDI).

The synergies and opportunities for inter-disciplinary consultation and discussions within this diverse group of resource professionals was a fantastic experience for all of us and, I think, a major factor in EMDI's success. We were also able to demonstrate to our Indonesian colleagues the benefits of working-level, informal interdepartmental communication and consultation. The Indonesian Government was structured in "silos" and informal interdepartmental contacts between staff at the working level, if not actually frowned upon, were certainly not encouraged. We were able to some extent through the AMDAL process to help our counterparts break down these silos.

As AMDAL advisors, we were afforded many trips around the country. This included annual AMDAL meetings with the provincial ESIA staff and project field trips in wonderfully diverse locations: Sumatra (Lampung, Medan); Kalimantan (Pontianak, Balikpapan); Sulawesi (Ujung Pandang); Malukus - the Spice Islands (Ambon); Nusa Tenggara (Kupang); and Irian Jaya (Tembagapura). The hospitality we were shown was remarkable, particularly early on when we had limited language skills.

To demonstrate the process of project auditing to replace the abandoned SEMDAL, I undertook, with BAPEDAL staff, audits of an irrigation project in Nussa Tenggara Timur, a

coal mine in East Kalimantan, a timber concession in East Kalimantan, two transmigration projects in Central Sumatra and Lampung, South Sumatra, and a copper-gold mining project in Irian Jaya operated by the Freeport Indonesia mining company (see Editorial Comment #5). With BAPEDAL staff Lynn carried out audits of several industrial factories in Jakarta and a textile factory in West Java.

In mid-1991, Lynn and I were asked by Minister Salim to prepare two background reports for the 1992 U.N. Conference on Environment and Development in Brazil: Lynn's on "Indonesia's Environmental Impact Assessment Process", and mine on "Rates and Causes of Deforestation in Indonesia". With regard to the latter, various agencies of the Indonesian government had over the years tried to argue that traditional small-holding swidden cultivators were the major cause of deforestation in the country (see Editorial Comment #6), but I was able to prove with the government's own statistics (something that Dr. Salim suspected) that the main causes of forest loss were illegal timber theft (primarily driven by demand for luxury woods from China), official government programs such as "swampland developments" (which were of very dubious socio-economic benefit) and, in particular, the World Bank-funded "Transmigration Program" (see Case Study #3). I also provided a critique of Indonesia's Tropical Forestry Action Plan (part of a world-wide U.N./FAO initiative) for the Canadian Embassy with recommendations on likely areas for Canadian technical assistance.

We returned from our summer 1991 home leave to a major reorganization. The new "Board for Assessing and Managing Environmental Impacts (BAPEDAL)", led by a new Deputy Minister Paul Coutrier (an improbable name for an Indonesian) - who had been transferred from the national petroleum corporation – now administered the revised AMDAL process. The Ministry of Population and Environment, under our previous Deputy Minister Nabiel Makarim, continued to deal with overall environmental objectives and policy. Together with other EMDI colleagues Lynn and I assisted senior KLH and BAPEDAL staff to draft goals and objectives, roles and responsibilities, and an organizational structure for both new entities.

HOME – Ampera Buntu, Kemang

I have to stress here that in Nabiel Makarim and Paul Coutrier we were extremely fortunate to work for two superbly competent Deputy Ministers. We were also privileged to work for Dr. Emil Salim, the Minister of KLH and BAPEDAL, who was one of the Members of the World Commission on Environment and Development (The Brundtland Commission).

Nabiel Makarim, who was our boss for our first year and a half at KLH, once jokingly said he wanted us to develop an AMDAL process that would function perfectly in a totally corrupt political system - which pretty accurately described Indonesia under the Suharto regime. Under Paul Coutrier's guidance for our last year we redesigned the AMDAL process to incorporate the following changes:

Provision of an initial project proposal (termed a Prospectus) that would allow the scoping of project impacts and the screening of the project to one of four options:

1. project exempt from the AMDAL process;
2. project requires AMDAL;
3. project unacceptable as proposed; or
4. impacts of the project cannot be determined and a pre-feasibility design must be prepared to identify potential impacts prior to an AMDAL decision.

With other BAPEDAL and EMDI staff and the AMDAL advisors in the sectoral agencies we prepared simple technical guidelines for a range of project types to assist in project impact scoping and project screening. Lynn also prepared a very concise "Guide to Environmental Assessment in Indonesia" in a brochure format that was printed in both English and Indonesian for the information of both the public and industry. Our final report entitled "Indonesia's Environmental Assessment Process (AMDAL): Progress, Problems and a Blueprint for Improvement" was published as EMDI Environmental Report No. 29 in 1994.

CHAPTER 15. INTERNATIONAL CASE STUDIES IN ENVIRONMENTAL AND NATURAL FOREST MANAGEMENT.

CASE STUDY # 1. Freeport Indonesia: Criminally Irresponsible Mining Development.

One of the more exotic and challenging projects I undertook in Indonesia was a request from Minister Salim to co-lead, with Dr. Soeriaatmadja of the Bogor Technical University (and an EMDI Director), an environmental audit of the Freeport Indonesia Copper/Gold mining operation in the province of Irian Jaya (aka West Papua - see Editorial Comment #7) on the Island of New Guinea. The audit team included my BAPEDAL colleague Bambang Purwono, and staff from the Ministry of Mines and Energy, the Ministry of Water Resources, the Ministry of Forests and Nature Conservation, and the Department of Public Works. The audit was carried out in May 1990.

The intent of the environmental audit was to determine whether an AMDAL report would be required for a proposed mine expansion that was already underway. In many respects the results of the audit were a forgone conclusion. The company began pre-production in 1973 and submitted an AMDAL report in 1984 when ore production, in tonnes per day, was 12,500. Subsequently production levels increased to 20,000 tonnes per day in 1988, 32,000 tonnes per day in 1990, and at the time of our visit was well on its way through a new mine expansion to reach 52,000 tonnes per day. No AMDAL studies had been submitted for any of the past expansions (a reflection of the Mines Ministry's incompetence and the irresponsibility and arrogance of Freeport Indonesia). In many respects, we would be preparing environmental and social impact assessment terms-of-reference for a project that was largely completed and thus had lost many opportunities to incorporate environmental considerations into mine and mill design, and to engage in social programs to benefit the native Papuan communities.

Freeport Indonesia is a subsidiary of Freeport-McMoRan Inc. of Phoenix Arizona (previously of New Orleans, Louisiana). The copper/gold/silver deposits in West Papua were originally discovered and described by Dutch geologists in 1938. They were "re-discovered" by Freeport in 1967 and more thoroughly explored over the next decade, when negotiations began and were concluded with the Indonesian government to develop a mining operation. The Ertzberg and Grasberg properties were intensively assessed by Freeport and in 1973 production began on the Ertzberg minesite. The copper deposits in New Guinea are "skarn" formations in which molten/igneous materials have been intruded from below into existing sedimentary rocks such as limestone or dolomite, however the two deposits were formed by quite different processes. The Ertzberg deposit was created by an up-thrust of concentrated molten material from a magma chamber below to form a dense, vertical "dike" of porphyritic, metal-bearing material. Over geological time the surrounding sedimentary limestone partially eroded away leaving behind a black phallic column emerging from a white limestone base that was worshipped as a "God" by the local Papuan peoples (needless to say there was no compensation offered to the locals for the "murder" of their deity). The Ertzberg deposit was

incredibly rich, with copper values averaging 2.65% and significant gold/silver concentrations.

By contrast the Grasberg deposit was formed by a diffuse upwards infusion of semi-gaseous magma into a sedimentary mountain. In cases like this the heavier metal values are precipitated in a central core, surrounded commonly by a "halo" of sulfide minerals, which has a significant implication for toxic acid leachate production from the excavation and overburden waste during and after mining. Copper values in the Grasberg deposit ranged from 0.5 to 0.7% with some associated precious metals. In developing the mining operation, Freeport created a deep-water port on the south coast at Amamapare, an airstrip at Timika, and a townsite at an elevation of 1900 m (6000 ft) at Tembagapura. The minesite was accessed by a 105 km road and an aerial tramway. Processed ore was transported from the mill to the port by a 110 km slurry pipeline. Tailings disposal from the mill was (conveniently and controversially) discharged directly without treatment to the adjacent Ajkwa River.

Over the next six days we toured both past and present mining operations, the milling facilities, visited the port site and ore loading facilities, and travelled the whole length of the Ajkwa River to assess the effects of tailings disposal.

Mine and processing facilities

Carstenz Meadow

Our audit revealed the following significant environmental and social issues that had to be addressed in the AMDAL report.

1. Tailings Disposal. Because of the rugged terrain, the Company judged that a mill tailings containment pond was not feasible and had been discharging tailings directly into the Ajkwa River since start-up, based on an earlier study by the Colorado School of Mines that concluded the river had the capacity to transport tailings directly to the ocean without serious negative impact. The mine expansion was estimated in its first six years (1990 to 1995) to generate a volume of tailings equal to 1.45 times the total

volume of the first 17 years. Even this early in the new mine expansion it was apparent that the mill was generating tailings that the river could no longer contain and transport. Significant tailings deposition was evident the length of the river. A fleet of D6 dozers was operating at all of the mine road bridge-crossings to prevent the river from diverting around, and washing out, the bridge abutments. As the river hit the coastal lowlands, it lost velocity and regularly over-flowed its levee, depositing considerable tailings into the adjacent lowland forests, and peat and estuarine marshes (one study estimated over 28 square km. of these native ecosystems had been severely impacted). In the acidic bog and marsh environments, heavy metals were mobilized from the tailings and were beginning to appear in detectable concentrations in the estuary itself.

2. Water Quality: Our audit team was presented on arrival with a study entitled Environmental River Study 1990, from information collected in February. The study concluded that: 1) the rivers of the study area naturally carry such a high sediment load that the tailings are not significantly altering natural processes; 2) the tailings are not toxic to aquatic life because of the alkalinity of the tailings discharge; and 3) the Ajkwa River has transport capacity in excess of that required to carry projected tailings loadings to the ocean. These conclusions were not only inconsistent with what was already observable on the ground, but were the result of a single set of "grab samples taken during one discrete sampling period". In other words, after 18 years of operation and tailings discharge to the river, the best information that the Company could provide was a single set of samples taken in February of the year of our audit. Even with this limited data-set there were some significant results that were contrary to the Company's conclusions. Contrasting contaminant levels in the **water column** in river reaches with and without tailings in three different sections of the river revealed that levels of suspended sediments were 10 to 45 times higher, levels of sulfates were 10 to 25 times higher, levels of arsenic were 3 to 7 times higher, levels of lead were 11 to 31 times higher and levels of manganese 58 to 226 times higher. Contrasting contaminant levels in **river sediments** for the same sections of the river with and without tailings revealed levels of arsenic were 19 to 27 times higher, levels of copper were 60 to 240 times higher, and levels of lead and zinc were 3 to 5 times higher. Even the limited results of this very inadequate sampling program were largely irrelevant, however, given that the average **daily** discharge at full production was estimated to be almost three times that of the whole five year period immediately preceding this one-time sampling program.

3. Acid Mine Drainage: The mine wastes from the Grasberg mine were likely to be very different both in quality and quantity from those produced from the Ertzberg mine. As noted, the Grasberg ore body is surrounded by overburden materials with very high sulfide concentration that constitutes a significant risk of acid mine drainage when excavated. Even the limited development work at the time of our audit had produced evidence of acid generation, including yellowish/red coloration on weathered ore, metal hydroxide and carbonate staining of exposed limestone rock faces, and orange colored streambeds and seeps draining excavated areas and road cuts. The mine manager claimed that these were attributed, by the Company's New Orleans

environmental services manager, to humic acids from the thick humus layers in these alpine environments. However, as we suspected, further study confirmed that they were the result of *in situ* mineral sulfide oxidation, and indicated a very serious risk of toxic acid mine drainage. The Company had proposed to dispose of waste rock materials to a small valley known as the Carstenz Meadow (see picture above Page 67), with very high native biodiversity. There was no outlet to the valley and all surface water drained to karst sinkholes. This would mean that toxic acid leachates could not be controlled and treated, and would probably be widely dispersed in regional groundwater.

4. Social Issues: The local populations consist of mine employees housed in company accommodation, two transmigration communities, and an indigenous Papuan community in the town of Kwamki Lama. Both the transmigrant and the Papuan community are almost entirely dependent on the mine for their livelihood. In addition, the mine has been a focus for significant informal in-migration. Our audit team concluded that there was an urgent need for a Regional Development Plan that would benefit from Company support and assistance.

The Company arranged two informal outings for us. The first was a helicopter trip to see the Puncak Jaya glacier, one of only three glaciers on the equator (Kilimanjaro in Tanzania, and Quon Kalis in Peru being the others – all of which are rapidly disappearing). This also gave us an excellent overview of the mining property and the adjacent Cagar Alam Lorentz National Park, which in typical Indonesian fashion overlapped with the mining property – something the Company would be required to address in its AMDAL report.

A short but interesting half day trip was to the Papuan village of Kwamki Lama where we met with local villagers, including a hunting party of young men who were armed with bows and arrows and were accompanied by several hunting dogs. The interesting part was their "attire" which is called the "Koteka". The men are otherwise naked except for the Koteka, which consists of a long dried and hollowed-out gourd. The gourd is placed over the genitals and fastened around the waist (of course pointing vertically) with leather straps. It didn't seem to me the most convenient or comfortable "garment" to do bush work in - but I guess whatever you get used to? I did wonder whether one got to choose the size (length?) of the gourd or

whether it was assigned to you, but I didn't know how to ask this even in Indonesian, let alone Papuan.

On our return to Jakarta it was unanimously agreed by the Ministries that an immediate AMDAL report was required. I was given the task of preparing a report on our site visit and terms-of-reference for the required AMDAL report, for review and approval by the relevant ministries. The Ministries ultimately agreed that the following major issues be addressed and actions proposed in the AMDAL (these were relayed to the Company in advance of a formal presentation):

1. It is apparent that continued disposal of tailings to the Ajkwa River is increasingly unsustainable and other tailings disposal options must be considered, including the possibilities of returning tailings to the Ertzberg open pit or the construction of a properly engineered, fully-sized tailings impoundment in the lowlands, fed from the mill by a slurry pipeline. Any tailings disposal option must address the containment and mitigation of acid generation from the new Grasberg tailings.
2. There is obviously a very high risk of acid mine drainage from the Grasberg mine and the company must provide in the AMDAL a detailed acid generation testing program for all materials produced from the mine (ore, overburden, waste rock and simulated tailings) and a comprehensive mining and materials handling program to prevent acid generation as far as possible and to contain and treat any leachates.
3. The company must propose in the AMDAL a progressive site stabilization, remediation and re-vegetation program, using native plant species wherever possible.
4. The company must undertake a legal survey of the overlap between the Lorentz National Park and the mining concession and outline its strategies to minimize and remediate any adverse effects of its operations on the Park.
5. The Company should fully describe its own social programs, indicate how it would support any proposal by local government to develop a Regional Socio-economic Development Plan, and examine how it might integrate its own social programs into this broader plan.

Our report concluded with a detailed Table of Contents for the required AMDAL report.

A meeting was then scheduled, chaired by Dr. Soeriaatmadja of the Bogor Technical Institute (representing Minister Salim), to formally present our field report, and the AMDAL Table of Contents to the Company. The meeting started out on a rather tense note when Freeport Indonesia's American Executive Director angrily demanded to know why I, a Forestry Specialist with no apparent mining credentials, had been responsible for compiling and writing the Field Trip Report and the AMDAL Terms-of-Reference. I was about to respond, when the chair Dr. Soeriaatmadja (who was on the EMDI Board of Directors) flashed me a hand signal, got up and explained that the audit team had been personally selected by Minister Salim, and then read out all of the pertinent mining-related portions of my EMDI C.V. as the reasons why Minister Salim had selected me for the task. (The "Good Doctor" afterwards confided to me that an Indonesian colleague on the Freeport Board had warned him that the company would try this discrediting tactic, so he had come prepared). The Executive Director sat down and said nothing further in the meeting.

It took, obviously, a considerable time for the Company to even begin to meet the requirements contained in our report and with other commitments and eventual preparations to leave Indonesia, I was unable to follow up, however I was much encouraged when Freeport hired Clifton Potter as their Water Quality/Pollution Control engineer when he finished his EMDI term. He and Nicki subsequently spent over two years in Tembagapura.

CASE STUDY # 2. Small-Scale Peasant Farmers: Ecologically-wise, under-appreciated and increasingly disenfranchised

Traditional swidden or rotational (often incorrectly termed "shifting") cultivation is a world-wide phenomenon on almost all tropical soils except nutrient-rich, youthful volcanic soils (i.e. the Islands of Java and Bali) and those alluvial soils on the deltas and floodplains of major rivers where fertility is maintained by regular seasonal sediment deposition (most of the major rivers of the Southeast Asian mainland). These are generally the soils that have been cultivated for centuries for intensive rice production by what have become the dominant "cultural and economic elites" in many of these developing countries.

Intensive agriculture on volcanic soils on Java

In contrast to these youthful (volcanic) or constantly replenished (floodplain) soils, those that occur on older upland geological formations are highly weathered, leached of nutrients, and as a result generally nutrient poor. Soluble nutrients on large-scale, mechanically cleared and broadcast-burned sites are quickly leached away in the rainy season – the important point here is that most of the nutrients on a site are contained in the vegetation and slowly decomposing litter. Many peoples farming such marginal lands have evolved very sophisticated practices, lumped generally under the term "swidden (or rotational) cultivation", to deal with the realities of their environment.

Examples of swidden cultivation

In this form of cultivation, vegetation is cleared to form small irregular plots and the debris is lightly burned so that the ash can act as a fertilizer. The clearing is incomplete, partly due to the limitations of hand tools, but also due to evolved ecological wisdom - useful native trees and shrubs are retained, and stumps and roots are left in the ground, both minimizing soil disturbance and providing for rapid re-growth when the plot is "rested". Cropping is characterized by complexity and diversity, often involving as many as 20-25 varieties of introduced and native plants. When crop yields begin to decline, generally between three and ten years, the land is allowed to fallow to native vegetation and the process of nutrient recovery begins. Farmers usually use fallowed land for native and introduced perennial tree and shrub crops and for minor forest products over the 5-10 year recovery period.

These peasant farmers carry in their heads a significant fund of sound ecological knowledge about plant species and soil properties, referred to by tropical agricultural specialist Peter Richards in a 1985 book as "the single largest knowledge resource not yet mobilized in the tropical agricultural development enterprise". This doesn't mean that traditional swidden practices can't be improved, but the wisest course of improvement is incremental change to practices that have stood the test of time under local conditions for many centuries. What is required is the recognition that, where the ratio of land to people is high enough to allow an adequate rotation (+/- 10 years), swidden can be adapted sustainably to many of the poorer soils of the tropics. Adaptations of, and improvements to, traditional swidden have much to offer existing and future agricultural development projects in the tropics, if Government planners and decision-makers would only take the time to listen and learn (the following description of the Transmigration Program shows how things can go catastrophically wrong).

CASE STUDY # 3: The Indonesian Transmigration Program: A Social and Environmental Disaster

In the 1970s and 1980s the World Bank funded and implemented two major resettlement programs: Poloneste in the Brazilian Amazon and the Indonesian Trans-Migration program. Both were very ill conceived, multi-million dollar programs that were described by one international development specialist as "the most ambitious resettlement schemes in the non-communist world". The significant environmental and social impacts associated with both of these projects, and a storm of international criticism, resulted in their termination in the late 1970s and mid-1980s. Largely as a result of these two experiences, the Bank formulated a comprehensive set of environmental and social "operational directives" described in Chapter 17. I'll confine this discussion to Indonesian Transmigration since it's the program I have direct experience with.

The Indonesian program was preceded by an excellent nation-wide biophysical resource inventory and mapping program carried out by the British Office of Overseas Development, termed the Regional Physical Planning Program for Transmigration (or, given the Indonesian love of acronyms, RePPProT). The tragedy here was that the guidance provided by this superlative program, combined with traditional swidden experience, could have contributed significantly to program sustainability, but was largely ignored by the trans-migration planners.

The intent of the transmigration program was to relocate farmer families from overcrowded Java, Bali and Madura to the "under-populated" outer islands of Sumatra, Kalimantan and, to a lesser extent, Sulawesi and Irian Jaya (see the table below). Land was essentially expropriated from local communities for transmigration projects, with little attention paid, or compensation provided, to the indigenous landowners. This was a source of serious discontent, particularly on Sumatra and Kalimantan. A more sinister, side effect of the program was that the introduction of Javanese transmigrants to the "outer islands" provided an excuse to establish or expand a national police and military presence, which frequently brutally mistreated the indigenous islanders (particularly on Kalimantan and Irian Jaya). To give some background to the following editorial comments, let me give an Indonesian geographical and demographic context (+/- 1985):

Island or Island Group	Area ($km^{2)}$	Population (millions)	Population Density (numbers/km^2)
Java/Bali/Madura	123,110	145 (61%)	1180
Sumatra	473,600	18.6 (8%)	39
Kalimantan	539,460	13.8 (6%)	26
Sulawesi	189,215	14.9 (6%)	79
Lesser Sundas (Bali & Nusa Tenggara)	74,504	14.7 (6%)	197
Malukus	45,923	2.8 (1%)	61
Irian Jaya	420,540	35.2 (15%)	84

The large differences in population density between Java (and to a lesser extent Bali) and the "outer islands" were attributed to "primitive/unproductive agricultural practices" in the latter, rather than to inherently limited land productivity and suitability for intensified agriculture; and therein lay the fatal flaw of the Transmigration Program.

Very early on in the development of the Transmigration Program a World Bank ecologist took issue with a statement that "these tropical soils tend to lose their fertility **after forest clearing"**. He correctly pointed out that "these soils are infertile even with a forest cover, the nutrients being locked in the growing forest vegetation and the slowly decomposing litter layer." After complete clearing in large scale projects, and especially after the common practice of intensive broadcast burning of the resulting debris, these nutrients are released but the soils have neither the chemical nor the physical capacity to retain them and they are lost to the site by leaching. This fact was completely lost on those responsible (both in the Bank and the Indonesian Government) for transmigration planning and implementation.

Transmigration planning started in the period 1969-1974, and the first movements of trans-migrants began with modest numbers in 1974-1979. Formal activities were greatly expanded in 1979-1984, when the objective was 500,000 families, and again in 1985-1990 when the objective was 750,000 families. Land allocations to each transmigrant family consisted of a 1 ha. house and garden plot and a 2 ha. main (usually rice) plot. In each of these periods, unofficial transmigration (termed swakarsa) was explicitly encouraged, though only minimally assisted, if at all. Swakarsa transmigrants became an increasingly larger component of the program over time. The official program was formally abandoned in 1986 because of a of lack of funding, due to both declining national petroleum revenues and the emergence of very serious problems on existing transmigration sites.

As often is the case with Indonesian statistics, estimates of actual numbers of "official" families involved from 1985-1990 (the only period for which complete statistics are available) varies widely, from 664,000 reported by the Ministry of Transmigration to 323,000 by the independent Transmigration Advisory Group based on actual site surveys. In addition it is estimated that as many as 455,000 families were involved in unofficial "swakarsa" transmigration during the same period. The total area of natural forest cleared during the approximately 20 years of official transmigration activities has been estimated at 3,925,700 hectares, with the majority in Sumatra (69%) and Kalimantan (19%). The rate of clearing was **wildly** in excess of the area actually required at any point in time because of almost no supervision of the contractors and their desire to "graft" the system with illegal wood sales. Contractors thus capitalized on both the land clearing contracts and paying no government royalties on the illicit sales of tropical hardwoods. In many areas the clearing was so extensive as to create excellent habitat for the native bearded bush pig (*Sus barbatus*) that thrived on both the newly emerging secondary vegetation and on the trans-migrant's food crops. The only people to benefit from this were the Batak people of North Sumatra who were Christian and thus perfectly happy to hunt with dogs and harvest "wild pork". Many Batak hunters were hired on Sumatra Transmigration Projects for bush pig control.

Critical analysis of the program leads to two inescapable conclusions:

1. The "officially sanctioned" allocation of 2.0 ha of land for main-crop cultivation and 1.0 ha for a house and garden plot was **completely** inadequate to support a family on most of the poorer soils of the outer islands, and people either returned to Java/Bali or moved on to create further deforestation as their original plots were farmed to exhaustion; and;
2. The swakarsa trans-migrants, who were encouraged but neither supported nor controlled by the Ministry of Transmigration, had become a significant force in land use change and deforestation. They provided a readily available labour pool for those commercial entities interested in natural forest conversion to crops such as palm oil, rubber and exotic wood plantations.

Final postscripts come from two independent evaluations of the transmigration program:

1. A French study in the late 1980s found that "80% of transmigration sites had failed to improve or even maintain the original (pre-migration) living standards of the trans-migrants" and
2. A British study by the International Institute for Environment and Development in 1985 concluded "the collapse of transmigration settlements is so common as to pose a significant problem for national security, as cities and towns are filled with abandoned, rootless refugees."

CHAPTER 16. RETURN HOME TO THE "LAND OF LOST MANAGERS" AND EARLY RETIREMENT: 1992-1994

We returned from Indonesia in July of 1992 to significant professional uncertainty for me. When Lynn and I were seconded to the EMDI project, I was a senior director. When we returned two and a half years later, there had been a provincial election and change of government, and a significant Ministerial reorganization. Almost all mid-senior level management positions had been filled except for a number for which the new Government was still trying to meet its employment equity targets to recruit more qualified women into management (an objective I fully supported). Lynn was placed in a senior policy advisor position, while I went into that management graveyard called Acting Director of "Special Projects". I was housed with several other undesignated managerial staff in a building adjacent to the main Ministry offices, which we quickly named "The Land of Lost Managers".

My initial assignment in August 1992 was as 'Provincial Coordinator, Fraser Basin Management Agreement (FBMA)' working once again under my old boss who was now Assistant Deputy Minister, Environmental Management Department. This assignment continued until April 1994. The FBMA was a joint agreement between the Federal Government, the Provincial Government and the many Local Governments (Municipalities and Regional Districts) within the HUGE Fraser River watershed. The objective of the agreement was "to promote sustainable development in the Basin with coordinated policies influencing the economy, environment, and social/cultural values". The Basin Board of 19

people was chaired by Dr. Tony Dorsey, Professor of Geography at U.B.C., and a close friend of my boss. My responsibilities were "to ensure that provincial interests were fully represented and included in the development and implementation of work plans, tasks and projects" and specifically to:

1. coordinate technical and policy submissions from all Provincial agencies associated with the FBMA;
2. chair a Directors' level provincial steering committee to obtain agency input to the Agreement and to coordinate provincial projects undertaken under the agreement;
3. undertake specific tasks such as the development of information systems, identification of resource inventory needs, and a survey of current jurisdictional responsibilities for land, water and resource management in the Basin;
4. serve as the senior provincial representative on the FBMA steering committee;
5. work closely with provincially-seconded staff of the FBMA office and provincial staff in regional offices; and
6. provide on-going advice to the three provincial members of the Board: the Deputy Ministers of Environment Lands and Parks and Small Business and Trade and the Commissioner for Resources and Environment.

In late-1992, I was given yet another temporary appointment by a Deputy Minister's letter as 'Acting Regional Environmental Operations Manager' to support my old boss, who had just been made Assistant Deputy Minister of Regional Operations. In addition to my continuing work on the Fraser Basin Management Agreement, I was to provide the main point of contact in headquarters for Regional Directors. In this capacity I coordinated regional inputs to revisions to the Forest Practices Code, the Provincial Forest Sector Strategy and the Commission on Resources and the Environment (CORE) report on Clayoquot Sound. I was also responsible for administrative coordination of regional operations, which included the very onerous task of final "vetting" of all out-going replies to letters to the Minister from the public that involved regional issues (usually averaging 5-10 letters a day). This was a most time-consuming and frustrating activity that generally involved significant re-drafting, because few staff took these letters at all seriously and most couldn't seem to put themselves in the Minister's position in drafting a reply.

By late-1993, it was becoming apparent that the FBMA Board had lost its focus. Dr. Dorsey and several Board members began to promote the idea of the Board assuming a governance role, similar to that of the British river basin management commissions studied by my boss during his 1979 sabbatical. To think that the Provincial and Federal Governments would consider establishing a fifth level of government on top of the existing municipal, regional district, provincial and federal structures was a "hair-brained" idea that could only have been concocted by a University academic. I was given the task of preparing a Provincial Government submission to an intergovernmental FBMP workshop in March 1994 rejecting the idea of a Commission, describing the many areas of inter-governmental interaction and coordination in the Basin, and suggested that the most valuable role the Board could play would be to promote intergovernmental cooperation and harmonization in program delivery – as auditor, evaluator and "whistle-blower" on intergovernmental dysfunction. This

submission was not well received by Dr. Dorsey and effectively ended my involvement in FBMP.

In late July 1993 I had received a call "out of the blue" at my office from Amnon Golan, Director of the Asia Technical Department of the World Bank in Washington, whom I'd met in Jakarta when he was visiting the Bank offices there. He had expressed considerable interest in the auditing process we had applied to the Freeport Indonesia Copper Mine and finally asked me "How much longer do you want to be a bureaucrat?" I replied "Not too much longer" and told him I had already decided to take early retirement in January 1995. He said "If you decide to 'hang out your shingle', I think we can keep you busy for at least 10 years".

He asked if it was possible for me to undertake a short-term contract in September and October to travel to India with a World Bank team to do a "pre-appraisal" of a proposed $850 million loan to modernize the Indian national coal company (Coal India). My task would be to develop terms-of-reference for the required environmental and social impact assessment to meet Bank requirements. I applied to the Ministry for an unpaid leave-of-absence, which was granted. I travelled to Washington D.C. on September 8th for three days of briefings and consultations, and had a short turn-around at home before departing for India on September 13th. Over the next six weeks I undertook field inspections of 25 of the 45 mines and associated electrical generation facilities being considered in the modernization program. I evaluated Indian environmental protection legislation and regulations, the environmental impact assessment process, and environmental assessment reports prepared for the mines under consideration to determine whether they conformed to World Bank standards. I prepared the environmental annex to the loan pre-appraisal report and a separate summary of major environmental and social impacts with mitigation recommendations. I returned home in late October and picked up my various projects where I'd left off.

Sometime in early 1994, I was in the executive offices and was approached by the Deputy Minister who said to me "You are a real puzzle. You're very well respected by Ministry staff but I've heard some not very favourable things about you". I asked him who the source of the "not very favourable things" was and he replied that he couldn't disclose this because it was told to him in confidence and was made by a private citizen outside of Government. I replied that I found this very unfair because it gave me no opportunity to defend myself, and after a moment's thought he agreed. He told me that the source was an old family friend Bill Moore, Vice President of Denison Mines. I could only laugh and explain the history (see page 88). He had the grace to be embarrassed and apologise, but I said it was all right because I had already decided that there no longer seemed to be a future for me in the Ministry. I went on to say that since returning from Indonesia two years previously I had worked for five members of the executive on a wide variety of 'special' projects, but in that time I had never had a formal position, a job description or an employee appraisal. Given this unsatisfactory situation I had reluctantly decided to opt for early retirement in January 1995 when I turned 55 years of age. I informed my Assistant Deputy Minister and the Human Resources Director of my intention soon after this and initiated the retirement process.

I visited a superannuation counselor in Human Resources and was advised to retire as of February 28th, 1995 and to work the first week of January, which would give me the full 1995 vacation of 35 days. However, I got an even more pleasant surprise when I was informed that with unused 1994 vacation, 1995 vacation, sick bank, strike leave, and a special retiring allowance, I had 99 days of leave pending retirement and my last day of work (except for the week in January) would be September 28th. I had been asked by Amnon Golan to return to India as of September 12th on the Coal India Project and so I took 13 days of leave without pay and departed the Ministry forever (except for my week in January, which in the end was excused as being unnecessary).

In looking back at my 30 years in private industry and government service I have to say that both were characterized by intellectual inertia, outdated thinking, and obsolete processes and programs. There were very few instances of a regular critical re-evaluation of activities that were clearly no longer meeting evolving expectations in order to establish a context for institutional renewal and reorganization. My all-time hero in terms of institutional transformation/renewal was Field Marshall William Slim, whose experience and philosophy is described in Editorial Comment # 8.

CASE STUDY # 4: ORGANIZATIONAL RENEWAL AND TRANSFORMATION.

One of the most outstanding examples of institutional transformation occurred in World War II in Burma and is described in Field Marshal Sir William Slim's autobiography "Defeat Into Victory". To set the historical context: Slim was born in 1891 and his early career was as an uncertified elementary school teacher in slum schools of Birmingham and as a junior clerk in a company manufacturing metal tubes. In 1912 he enrolled in Birmingham University and enlisted in its officer training corps (OTC).

In 1914 he was gazetted 2nd Lieutenant in the Royal Warwickshire Regiment. He subsequently fought in Gallipoli, where he was seriously wounded, and then in Mesopotamia where he won the Military Cross for gallantry and was wounded again in 1917, and was then evacuated to India for the remainder of the war. In 1919 he transferred from the British Army to the Indian Army (a common move for young officers of limited patrons and financial means) and was gazetted captain in the 6th Gurkha Rifles. Through the 1920's and 30's his career advanced to Lieutenant Colonel in 1938 and to Brigadier in 1939 in command of an Indian Brigade fighting the Italians in Eritrea. He was wounded in early 1941, evacuated to India, and subsequently promoted to acting Major General fighting in Syria, Iraq and Iran. This advancement was quite extraordinary given that he was a middle-class boy with no family connections, no important patrons in the military, and didn't go to Sandhurst. Despite this success his talents were not widely recognized by senior upper-class officers or, for that matter, by Winston Churchill who considered him a "second-rank" commander.

In early 1942 Slim was appointed commander of Burma Corps, described by a compatriot as "a promotion one would not have wished on an enemy, let alone an old friend". The situation was horrible – Hong Kong had fallen, the Japanese had conquered all of Malaya and taken

Singapore, and Thailand had joined the Japanese, leaving the way open for the conquest of Burma, and ultimately India. The handling of the ensuing Burma campaign by the senior British commander was little short of disastrous and by mid year British and Indian forces were in full retreat back to India. Of all the forces engaged only Slim's "Burma Corps" conducted an orderly, fighting retreat and returned to India largely intact. Unfortunately, though Slim was held in highest esteem by the officers and men he commanded, it was the overall British commander who took credit "for one of the great defensive battles of the war" and blamed Slim for many of his own blunders. Slim spent the next year in "backwater" assignments but after being sent to extract the army from another horribly bungled campaign in the Aarakan (for which another hopeless British commander attempted to blame him) he was appointed in late 1943 Commander-in-Chief of the newly-organized 14th Army Group comprising a polyglot of British, Hindu and Muslim Indian, Gurkha, and East and West African formations.

As described in "Defeat Into Victory", Slim recognized that one of his first tasks would be to restore the morale of the defeated and shattered army. He reasoned that "morale, if it is to endure, must have certain foundations: spiritual; intellectual; and material. Spiritual first, because only spiritual foundations can with-stand real strain; intellectual next, because people are swayed by reason as well as feelings; and material last – important, but last - because the very highest kinds of morale are often sustained when material conditions are lowest". He tabulated the foundations of morale as follows (somewhat re-phrased to take it out of its strict military context and put in a broader institutional context):

1. Spiritual
    a) People must be made to feel that they are engaged in a good and noble enterprise that is important to society.
    b) The method of achievement must be active.
    c) People must feel that who they are and what they do matters towards the goals of the enterprise.
2. Intellectual
    a) People must believe that the goals can be achieved; that they are not out of reach.
    b) People must believe that the organization they work for is an efficient one that will provide a context for the effective employment of their efforts; and will not squander their time and energy on useless or irrelevant activities.
    c) People must feel that they will get fair and respectful treatment from their superiors and from the organization.
    d) People must be given a voice in decision-making.
    e) As far as possible people must be given the legal and material tools to carry out their jobs effectively and efficiently.
3. Material
    a) People must be given a voice in decision-making.
    b) As far as possible people must be given the legal and material tools to carry out their jobs effectively and efficiently.

Not a bad set of principles to guide the continual process of renewal in any organization or institution.

From late 1943 to May 1945 Slim totally changed the entire culture of the 14th Army Group, fighting a brilliant series of offensive battles that led to the capitulation of all Japanese forces in Burma – the single biggest land-based defeat of the Japanese in the war.
On rebuilding the morale and effectiveness of the British/Indian army, Slim ascribed the failures of his predecessors to overly rigid strategies that became liabilities when situations were in rapid change. He defined a good strategy as:

> "a commonly understood and accepted framework or basis from which to adapt to uncertainty, change and organizational ambiguity".

He points out that any strategy begins to enter obsolescence the moment it's formulated, and thus is time-limited and must be regularly revisited. He attributes his successes to the creation of a flexible strategy that provided both enough direction to ensure cohesion and coordination, and sufficient latitude for his field officers to make plans, take decisions and initiate action based on local conditions and changing circumstances.

Slim went on to become Commander of the Imperial Defense College (1946), Chief of the Imperial General Staff (1948), Field-Marshal (1949), Governor General of Australia (1953), Knight of the Garter (1959), and elevated to the peerage as Viscount Slim of Burma (1960). He died in London on the 14th of December 1970.

CHAPTER 17. CONSULTING - THE WORLD BANK AND OTHERS: 1993-2014

The World Bank (WB) or to give its official name, the International Bank of Reconstruction and Development, was formed in 1946 along with the International Monetary Fund (IMF) as part of the U.N. system by the "Breton Woods Agreement". Initially its mission was to facilitate the reconstruction of war-ravaged Europe (the Marshall Plan) with funds almost completely provided by the U.S. Government through the IMF – an act of incredible American altruism. From the reconstruction of Europe, the Bank then moved more broadly to a mandate that included the "ending of extreme poverty and the building of shared prosperity in the developing world".

Unfortunately, the Bank seemed to lose its way for a while, concentrating on large development projects such as major dams and the transmigration programs previously described. The increasing controversies associated with the transmigration projects, a scathing report by Canadian Chief Justice Thomas Berger on the Indian Sardar-Sarovar Dam Project over completely inadequate resettlement programs of people displaced by the reservoir, and an influential book by Graham Hancock, entitled the "Lords of Poverty", caused the World Bank to reconsider its focus, and prepare what are now world-class, environmental and social policies, and comprehensive impact assessment and management procedures for all of its programs and projects, as described below.

The World Bank: Environmental and Social Safeguard Policy Objectives.

1. To ensure environmental and social soundness and sustainability of Bank investment projects.
2. To support the integration of social and environmental considerations into the project decision-making process.
3. To support environmentally sustainable development by incorporating the protection, conservation and rehabilitation of natural habitats and their ecological functions.
4. To minimize and manage the environmental risks associated with pesticide use, and to promote and support safe, effective and environmentally sound pest management.
5. To avoid or minimize involuntary resettlement, and where not feasible, to assist displaced persons in restoring or improving their livelihoods and standards of living in real terms relative to pre-displacement levels.
6. To design and implement projects in a way that fosters full respect for indigenous peoples dignity, human rights, and cultural uniqueness, and so that they may (a) may receive culturally appropriate social and economic benefits, and (b) do not suffer adverse effects during the development process.
7. To realize the potential of natural forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests. To assist in preserving physical and cultural resources (PCRs) and avoid their destruction or damage. PCR includes resources archaeological, historical, paleontological, architectural, religious, or aesthetic significance.
8. To ensure quality and safety in the design and construction of new dams and the rehabilitation of existing dams, and in carrying out activities that may be affected by an existing dam.

Environmental and Social Impact Assessments (ESIA)

To meet the environmental and social safeguard objectives, the Bank has developed one of the strongest environmental and social impact assessment processes in the world. This process has been a model for the associated regional development banks such as the Asia Development Bank (ADB) and the Inter-American Development Bank (IADB). The Bank's policy on ESIA is stated as follows:

1. An ESIA is required of all projects proposed for funding to ensure that they are environmentally and socially sound and sustainable.
2. The depth, breadth and type of the ESIA analysis will be dictated by the nature, scale and potential impacts of the proposed project.
3. The ESIA will evaluate risks and impacts, examine project alternatives, and lead to improved siting, planning, design and mitigation; in the process preventing or compensating for adverse impacts and enhancing positive impacts.
4. The ESIA will take into account the natural environment, human health and safety, social aspect (especially displacement and resettlement), and indigenous peoples and their physical/cultural resources.
5. The borrower is responsible for carrying out and implementing the ESIA.

6. The Bank advises the borrower of its ESIA requirements and reviews the resulting ESIA to ensure quality and that it provides an adequate basis for project approval, funding and implementation.
7. A Pollution Prevention and Abatement Handbook defines pollution management measures and emission levels acceptable to the Bank.
8. Alternative environmental and social assessment instruments may be employed at a variety of levels including project-specific, sector-wide, and strategic (regional), and may include tools such as project and program audits, hazard/risk assessments, environmental management plans, and environmental and social frameworks.
9. ESIAs will require significant consultations with project-affected peoples, NGOs and community leaders, the results of which must be reported in the ESIA.

These policies and operational directive became my "bible" over the 20 years that I worked primarily for the World Bank and UN Agencies as a regular staff consultant, but also for private sector companies as an environmental sub-consultant. In terms of my World Bank projects I functioned in the rather weird position of "being hired by the World Bank to prepare, on behalf of the project proponent, an independent environmental and social impact assessment for submission to the World Bank" - talk about a difficult and convoluted process! However, it was sweetened a bit because the compensation I was being paid, under a U.N./WB/Revenue Canada agreement, was U.S. $700 per day net-of-tax. It's worth noting here that Canada and a few other, largely European and Commonwealth countries have said, in effect, "We provide funds to multi-lateral international aide agencies to do good works in the developing world, so it doesn't make sense for us, when you employ our citizens, to reclaim some of that money through income taxes. So, if we can agree on what would reflect a net-of-tax fee we'll let you retain the balance". The benefit to me was that I still got paid well but my net-tax-remuneration meant that my annual income tax return was MUCH simplified.

Over the next 25 years I carried out environmental impact assessments for mining projects (India, Indonesia, Cuba, Cambodia and Panama), natural forest management projects (Bhutan, Cambodia, Laos, Mongolia and Guyana) and industrial wood plantation projects (China, Indonesia and Vietnam).

In my international forestry work one of my main challenges has been to discourage ill-considered artificial plantation/reforestation programs because I think they are usually completely mis-managed, can have significant detrimental impacts on natural forest composition and/or the long-term productivity of many tropical soils, and often result in the expropriation of land from indigenous people. In my environmental impact assessments I have stressed silvicultural/harvesting programs that preserve native forest structure and composition, promote natural regeneration, and limit nursery and planting programs to demonstrated situations of regeneration failure. One of my major interests and concerns has been the impact of these projects on indigenous forest-dwelling peoples and the ecological resources that sustain them. In my years as a consultant I've witnessed the destruction of tropical and sub-tropical rainforests in many parts of South East Asia - Sumatra, Borneo, New

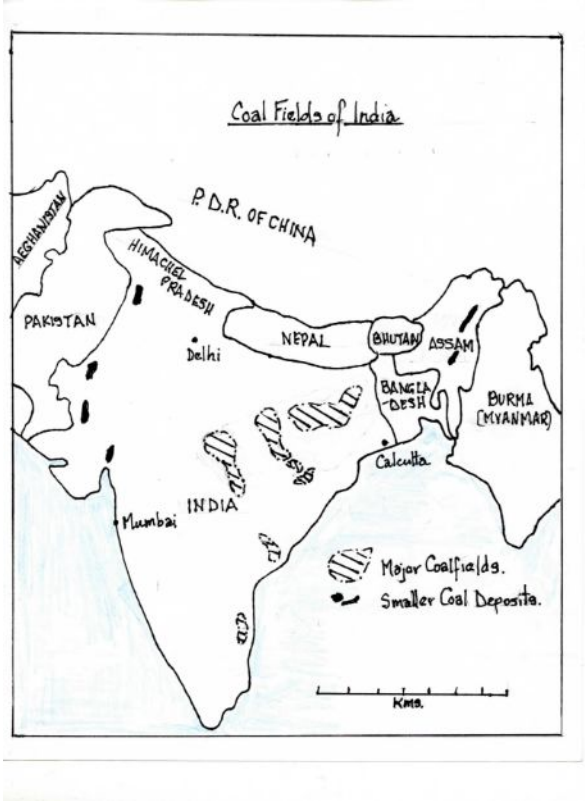
Guinea, Cambodia, Malaysia, and Burma - for conversion to uses that are simply unsustainable, generate significant carbon emissions, and have had serious impacts on biodiversity and the welfare of indigenous peoples.

Following are brief descriptions of my most interesting international projects in roughly chronological order.

India

1993 – 95: Consultant to the India Department of the World Bank

On behalf of Coal India Ltd., for submission to the World Bank, I prepared a sectoral impact assessment covering all 45 mining projects proposed for a loan of US$ 850 million. The assessment was based on a review of existing ESIA documents for all the existing projects and of 30 detailed on-the-ground minesite compliance audits which I carried out, and which included review of available air and water quality monitoring data, and progress in mined-land rehabilitation. This sectoral assessment also included a review of occupational health and safety programs (with advice from my old B.C. Ministry of Mines, Heath and Safety colleagues), the resettlement/ rehabilitation of local people displaced by mining activity, and the relationship between the coal mines and the electrical power plants they supplied.



The environmental and social programs of the mining operations audited varied greatly from exemplary to incompetent, and it was obvious that Coal India, as the governing body, had not established any consistent standards of individual company performance or regulatory compliance. The most obvious on-site environmental and social problems related to extremely poor (toxic) air quality, open pit and overburden dump instability, contamination of surface and ground water, worker health and safety, the lack of planning for eventual site remediation and reclamation, inadequate regional air and water quality management and monitoring, and inadequate attention to broader land use and human community impacts (particularly community encroachment and forced resettlement).

A major environmental/land use issue that had not been previously raised related to poor coal quality and the resulting ash generation at the power stations. No coal quality standards had been established and the power stations were required to accept all coal delivered regardless of quality or contaminant levels. The result was that the generation, disposal and containment of ash waste from power plants was rapidly becoming the single most serious land use and water contamination issue associated with electrical power generation. The mining projects would have in future to pay much more attention to in-pit quality control and on-site wash plants, with "reject materials" returned to the open pits. One issue I wasn't able to address because it was outside my purview was the impact of the power generation facilities on regional air quality which, as the following pictures will attest, was very serious (left hand picture: – power plant emissions, right hand picture: – emissions from spontaneous coal seam combustion.

I delivered the Environmental Assessment to Coal India and the World Bank in April 1995. In September I got a phone call from the World Bank asking me if I could come to Washington immediately for what might be a month. In the words of the very English Bank-person relaying the request "Coal India has played 'silly-buggers' with your assessment and removed many of the important impact management requirements". I was asked to help Bank staff negotiate all of the important mitigation measures back into the loan agreement. I can still see the looks on the faces of the Coal India Executives when I walked into the conference room on the first day. We were, of course, successful and what had been a US$ 850 million loan project became a US$ 1.2 billion project.

Indonesia

1994 – 95: Consultant to the Southeast Asian Country Department, World Bank

I prepared a Regional Impact Assessment for a major, 13,790 sq. km. national park/biodiversity conservation proposal (Kerinci-Seblat) on the island of Sumatra. The assessment was required by the World Bank before consideration of funding by the Global Environment Facility (GEF). The assessment included an evaluation of: 1) the extent to which park design and management met GEF criteria for natural resource and biodiversity conservation; 2) the potential impacts of adjacent development activities on biodiversity conservation and park integrity; and 3) the impacts of the park proposal on regional opportunities for economic development. Kerinci-Seblat was formally designated a national park in 1996.

1994 – 95: Consultant to the Canadian International Development Agency

I was the environmental specialist on a design mission to develop a Canadian program to continue environmental management assistance to the Government of Indonesia as a follow-up to the EMDI project. The project targeted the national and provincial levels of government, and included public sector, private sector, universities, and partnerships with other donors. The design team developed a set of key strategic objectives for the project and prepared a conceptual management plan for submission to CIDA, the Government of Indonesia and other potential partners.

1996 – 97: Senior Consultant to the United Nations Development Program, Jakarta, Indonesia

In this project I led a two-person consulting team (with ex-EMDI colleague Brian Yates) to develop a five-year, post-United Nations Conference on Environment and Development (UNCED) environmental and natural resource program for the UNDP Indonesia. The project entailed: 1) a review of the Government of Indonesia's programs and priorities in environmental management and sustainable resource development; 2) a review of existing assistance to Indonesia by bi-lateral and multi-lateral donors, 3) identification of gaps and opportunities for partnerships; 4) initial identification of 6-8 sub-programs or projects for consideration by the UNDP and the GOI; and 5) development of conceptual designs and budget estimates, in consultation with relevant GOI staff, other donors, and NGOs, of the five sub-programs provisionally accepted by the UNDP and GOI.

1998: Senior Consultant to the United Nations Development Program, Indonesia

I prepared detailed project proposals for the provision of UNDP assistance to Indonesian government environmental agencies to improve the manner in which they collect and analyze information necessary for strategic policy and program development. The objective of the project was to rationalize the provision of such information through the selection of a limited number of appropriate environmental indicators. Recommendations were made on the design and implementation of formal, systematic and replicable monitoring programs, on roles and responsibilities for monitoring programs, and on mechanisms for regular reporting to senior decision-makers on the state of the environment and on important environmental trends.

I conducted the above two projects in partnership with previous EMDI colleague Brian Yates.

2002 – 2003: Senior Technical Advisor to the Canadian International Development Agency

I undertook a technical evaluation of, and provided advice to, three Canadian Climate Change Development Fund projects - two in Indonesia (Sumatra and Kalimantan) and one in East Timor, linking community-based forest ecosystem management systems to improved carbon retention/sequestration.

Bhutan

1995 – 96: Environmental Impact Assessment and Monitoring Consultant on the World Bank-financed Third Forest Development Plan Project, Bhutan

This project was funded by the World Bank and implemented by the Forestry Department of the FAO and the Bhutanese Forest Services Division. It was to comprise three components: 1. natural forest management, 2. social forestry, and 3. reforestation of degraded forests. I'm going to concentrate in this discussion on the first component for four reasons: first, it demonstrates just how "clueless" the staff of some of these international organizations were about their respective obligations, responsibilities, and procedures; second, the project had chosen a completely inappropriate silvicultural system for these unique forests involved in the

project; third, the project did not capitalize on the incredible flexibility of the proposed log extraction system to meet silvicultural objectives; and fourth, it was one of the most wonderful (though acrimonious) experiences of my career in a magical country that I had the privilege of visiting five times over the next six years.

For those very few people as dumb as Donald Trump, who might have thought that the country and its western neighbour were actually named "Button" and "Nipple", the forest communities of Bhutan and Nepal stretch from the tropical "terai" swamp forests and wet lands along the Indian border, through dry, pine-dominated foot hills, to the rich, moist gap-driven hardwood and coniferous forests on the "shoulder" at the base of the High Himalayas. The country is a Kingdom with, during my time there, Jigme Namgyel Wangchuk as king. He and his father had ruled over the years very wisely, and he very early declared that Nepal would not be Bhutan's development model. He said Nepal's rapid and uncontrolled tourism development had taken an environmental and cultural toll on the country, and that Bhutan would take a much more measured approach, aiming initially at controlled, high-end tourism that highlighted Bhutan's unique culture and environment, and involved local communities in the tourism enterprise in a sustainable and culturally-appropriate manner. Only gradually and incrementally would tourism infrastructure be expanded. He is the only living king who has voluntarily abdicated in favour of a democratically elected parliament, though he still wields much respect and influence.

The broadleaf forests on the shoulder of the Himalayas, which would be the focus of our project, are composed of multi-aged, species-rich, moist temperate hardwood forests on plateau and ridges, and warm sub-tropical hardwood forests in the valleys – all of which are a disconnected extension of the rich Eastern European/Central Asian hardwood forests. They are "gap-driven" which, as explained earlier, means that they regenerate not through extensive disturbances, but through small openings created by the death of individual trees or small groups of trees. Larger openings in these forests are rapidly invaded by alder (*Alnus)*, willow (*Salix*), *Rhododendron,* and other "pioneer" woody shrub species. This gap-driven characteristic should have dictated the way in which these forest communities where to be harvested but, as I'll explain, did not.

The project began in 1994 with the Forestry Department of the Food and Agriculture Organization of the United Nations (FAO) providing the direct technical assistance to the Bhutanese Government – the first time this U.N. agency had been chosen to undertake this role in a World Bank project. A Chief Administrative Officer was appointed and an office established in the capital Thimphu, and a field station set up in Tashigang Province in the far east of the country. The World Bank Task Manager based out of Washington was a German/Finn, who was under some sort of a World Bank "cloud" for expense account "discrepancies". His responsibility was to provide overall technical and administrative control but he gave the project very little attention, supervision or direction. Project management activities began with the unfortunate selection of a Project Manager by FAO, Peter Chong (a Malaysian forester) who was both incompetent and, as we later came to suspect, probably corrupt. He repeatedly bragged that as a retirement bonus from the Malaysian Government he had been given 300 ha of rainforest in Borneo, which he promptly

had clear-cut at considerable profit, and then sold to a palm oil plantation for a total return of US$ 200,000. Fortunately, the project also hired an Austrian forest engineer, Gerhard Roetzer, who was an expert in road building and cable-yarding logging systems in mountainous terrain, and helped the project contract an Austrian/Swiss cable-logging manufacturer with excellent technology.

At some point the Chief Administrative Officer said to the World Bank Program Manager, on one of the latter's infrequent supervision missions, "Um, don't we require an environmental impact assessment for the project". The reply was "Of course not, we're an environmental project". Luckily he did check with his superiors in Washington and they said "Of course you need an ESIA, what were you thinking?!! This is a forest management/forest harvesting project". Somehow (I think EMDI colleague Tony Whitten, who was now with the Bank, was responsible) I was recommended for the project and I was soon headed on very short notice for Bhutan.

The general objectives of my consultancy were: 1) to carry out an initial assessment of potential environmental impacts associated with the project as proposed; 2) to recommend appropriate environmental impact management strategies, including project modifications and selected forestry codes-of-practice; 3) to develop a detailed environmental monitoring program, including both environmental condition/trend monitoring and environmental compliance monitoring; and 4) to train counterparts in the Nature Conservation Section, Department of Forests in environmental assessment and monitoring techniques.

From the outset there was a lack of understanding that my assessment had to be based on a proposed management plan and program, and that I was required under the World Bank regulations to be completely independent in my assessment of the project. The next year and a half was to be a constant struggle, particularly against the Malaysian FAO project manager, to reinforce and maintain that necessary context and independence.

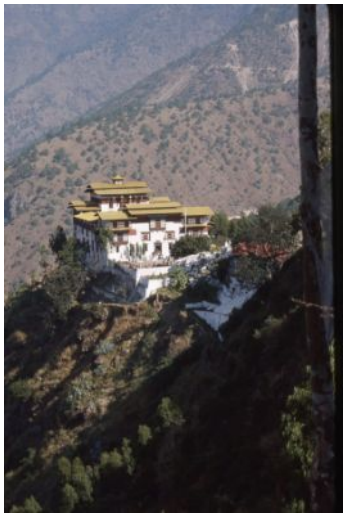
In early January 1995 I flew to Bhutan for an initial short-term orientation mission. I flew to Hong Kong and then by a tiny 50-passenger British Aircraft Corporation commercial jet to Bhutan. Surprisingly the airport is not in the capital Thimphu but in the next valley to the west in the town of Paro - an hour and a half drive. When you get to Thimphu you understand because it is very topographically constrained. However, even Paro is a bit breathtaking, because you approach from the south, fly over the town into a side "box-valley", do a 180^0 turn with the mountain sides sailing past the wingtips to land down-slope at the airport – WHEW! Thimphu is a charming little city - beautiful Himalayan architecture and very clean. The only problem was the continuously reproducing, mangy, stray dog population (Buddhists don't do animal control) that seemed to fight and fornicate all night. This seemed to change at some time during my many visits when the city council secretly (?) hired some tribal people from northeastern India to do a major dog cull (and probably harvest the meat? - sorry Rachel).

I spent four days in Thimphu being introduced to project administrative staff, senior Bhutanese Government officials, and one of my two counterparts, K.D. Chamling, an ethnic-Nepali forester, who was assistant project manager. I was then to proceed to Tashigang, the project field station, where I would meet the project manager Peter Chong for a full orientation on the project. Almost as an afterthought the administrative officer said "Oh, by the way there's no telephone or e-mail service yet in Tashigang so you might want to phone your family and tell them you'll be out-of-contact for the next four weeks."

I set out after four days in Thimphu on the world's longest/highest roller coaster. The national highway was build by the Indian Military shortly after the 1950 Chinese invasion of Tibet, when China was seen as a threat to both Bhutan and northeastern India. The distance from Thimphu to Tashigang "as the crow flies" is about 150 km. The distance by road though Wangdi Phodrang, Tongsa, and Mongar Districts is over 300 km. The road traverses one pass over 5,000 m (16,400 ft), 3 passes over 4,000 m (13,100 ft), and 4 passes over 2,700 m (8,860 ft). After each pass one plunges down into sub-tropical valleys at elevations of 1000 to 1500 m (3,280 – 4,920 ft). Many parts of the road consist of a single lane with a vertical wall upslope and a vertical cliff downslope. Bhutanese driving was notoriously erratic, as evidenced by the many rusting vehicle hulks along the base of the steeper parts of the road.

Bhutan's national highway

The main administrative centers in each Bhutanese Province are situated in historic monasteries called Dzongs, which now do double-duty as the district Buddhist Monastery and the offices of government. They were built originally as fortresses at strategic points around the country for political/military reasons to deter Tibetan invasions. They are impressive structures consisting of a central tower, often with a bronze roof, built in the middle of a large walled compound. Monks' cells and administrative offices line the inside walls of the compound. Presumably for strategic purposes, they were usually situated in such a way that they dominated the landscape and could be seen from significant distances. In terms of travel time however, this was often tantalizingly-deceptive, because if they were on the other side of a deep valley, they come into view (and you think "Phew! Almost there."), but then you often have to travel a considerable distance up the valley before being able to turn back downslope to the Dzong.



Dzongs (historic monateries)

I arrived in Tashigang after two long days driving and checked into the project guesthouse, which was situated on a ridge at 2000 m (6,560 ft) elevation above the adjacent river valley with a spectacular view. I was met there by Peter Chong and Richard Salter. Richard was an American biologist from Portland, Oregon who had been engaged by the project to do a faunal survey (mammals and birds) of the project area. It was typical of the project that this was a one-off, two-week study in each of three "production forest areas", at only one season of the year, and that this was considered adequate for the project. Both Richard and I made the point that this survey should be considered only a very preliminary inventory and would have to be supplemented by further assessments covering all seasons. Despite these limitations the results of Richard's study were impressive – 136 bird species and 27 major mammal species (i.e. not including very small or secretive species). Richard explained to me these forests support major bird and animal concentrations when the beech and oak fruits (nuts and acorns) are shed in late summer, and there were major migrations of both tropical and alpine bird and animal species to feed on these high-energy resources in late summer and fall. Unfortunately, but reflective of project planning by M. Peter Chong, this was not a time of year that was accommodated by Richard's contract.

The next day Peter Chong took me up to the project office, located about 3 km. uphill from the guesthouse, and introduced me to the filing system. I asked if there was a draft management plan for the project that I could review, and he replied that he had not had time to commit to that yet (though he'd been on staff for seven months at this time). The next day he took me out to the first logging area to see the skyline logging system in operation on a 1000m by 65m strip clear-cut. This was the first of what were to be a series of strip clear-cuts separated by 100m temporary leave strips. I expressed serious concern that both logging and road construction was in progress prior to an approved forest management plan and the required World Bank environmental impact assessment, but he seemed to think that these were minor considerations. Over the next three days we visited three future logging areas where there was road construction in progress. He then stunned me by saying that he had some important commitments in Thimphu and could only stay in Tashigang until the next day. He said that I could have full access to the office and files, and he would send the vehicle back in five days for my return to Thimphu.

I reiterated that I was really concerned that the project was already being implemented without even a preliminary management plan, which was itself a prerequisite to the environmental and social impact assessment required for World Bank approval and release of funding. I said that on my return to Thimphu I would expect at least a conceptual management statement, or I would have no option but to "blow the whistle" on the project to the World Bank in Washington. I also said that I couldn't understand how the World Bank Task Manager had allowed things to get so far out of control.

I stayed in Tashigang for five more days, walking 40 minutes up the road to the office each day (a bit of a breath-taking experience at that elevation) and becoming friendly with the cheery and curious neighbours. I reviewed pretty uninformative office files. One thing I did find in the files that concerned me was a log inventory of the one completed logged area that showed logs arriving at the skyline landing and logs arriving at the sale yard at Samdrup Jongkhar on the Indian border. Somewhere between the logging area and the sale yard several large, very valuable black walnut logs appeared to have "disappeared".

I returned to Thimphu to find Project Manager Chong "missing in-action". No one seemed to know where he was and I didn't see him again until I returned on my next mission. He did however leave me with a "conceptual management statement" that could have been written on the back of an envelope. It essentially said that the aim of the project was:

> "To achieve maximum possible sustained yield of wood products by converting (clear-felling) unproductive native forests to high-yielding plantations of important industrial species to be managed on 70 to 80 year rotations".

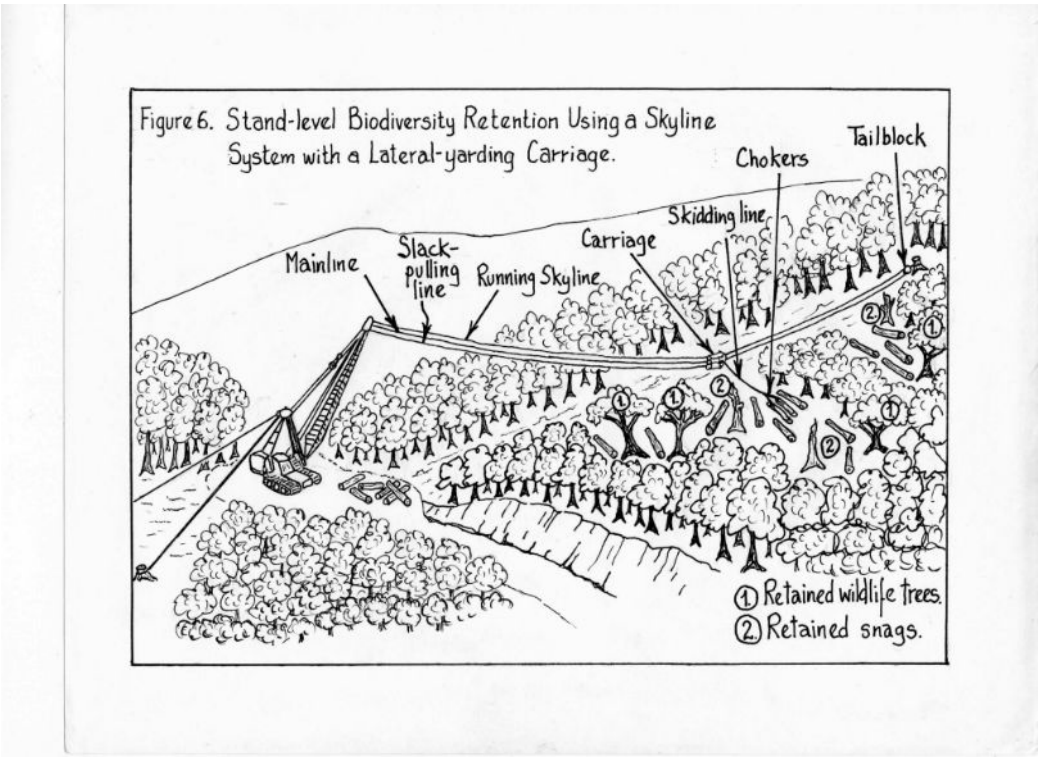
Quite apart from any considerations of biodiversity or ecological values, these native forests were not "unproductive" by any accepted criteria. Stand inventories showed commercial species volumes of 330 m^3/ha and 240 m^3/ha for 10+ and 50+ cm diameter classes respectively. By comparison, well-stocked, selectively managed tropical forests in Malaysian Borneo (which Mr. Chong should have been well aware of) had comparable values of 210 m^3/ha and 130 m^3/ha. In the Bhutanese forests, over 55% of the "growing stock" was in stems 70+ cm in diameter. The picture that emerges from these figures was of primary, gap-driven, multi-aged, multi-storied temperate forests of great age and very high, unique biodiversity and wood values. And yet the primary management prescription proposed was the same approach of simplification and homogenization that had produced serious controversy, forest degradation, and carbon storage depletion in gap-driven ecosystems elsewhere in the region.

On the basis of this totally inadequate and inappropriate management statement, I knew that the project was already in serious trouble and was completely perplexed that the World Bank Task Manager had allowed this to happen. Not only was the proposed

management/harvesting system contrary to World Bank Operational Directives on forestry, it was also contrary to the Bhutanese Forest legislation which required an approved forest management plan prior to any commercial activities - so much for supporting local legislation and policy requirements in project implementation by FAO.

I returned to Bhutan for a second mission in May-June 1995 and was introduced to my two counterparts: K.D. Chambling, the Assistant Project Manager and Deki Yonten of the Forest Service's, Nature Conservation Section, both of whom were to become valued colleagues. On this mission I was also informed that one of my responsibilities would be to report not just to the Forest Services Division but also to the National Environment Commission and its Deputy Director, Tshering Tashi (a cousin of the King who was to become hugely supportive).

A few days later, Gerhard Roetzer arrived from Austria to join the team. Over a beer at our hotel restaurant the first night I confided my misgivings about the project. I said I was concerned about the inappropriateness of clear-cutting as the silvicultural system of choice for these closed forests, and asked whether the Skyline extraction equipment could accommodate single-tree or small-group selection. Gerhard responded with a huge smile and said "Thank God you're here!!" He explained that the Austrian skyline, cable-yarding system had a 'slack-pulling" carriage which would allow the "chokers" (or wire cable lassoes) to be extended laterally from the sky-line up to 30 m on each side to engage logs and yard them to



the skyline where they could be lifted off the ground and transported to the landing. Thus, as he had been arguing without success before my arrival, the equipment could be adapted to harvesting for **any** silvicultural system. Gerhard, K.D. Chambling, Deki Yonten and I set out to redesign the project. We toured all of the proposed project sites over the next few weeks looking at proposed harvesting areas and road-building activities. Several of the proposed harvesting areas were characterized by "crazy trees" where the landscape was so inherently unstable (steep and waterlogged) that the trees were no longer holding the slope together and were pointing in all directions as the slopes failed. There was an apparent urgent need for the services of a geo-scientist to provide landscape stability analyses for both road building and harvesting activities.

ues – from left
Gerhardt Rosser,
Yonten

One mildly amusing incident on the accommodation side occurred in Thimphu during this visit, with the "invasion" of about 50 Indian laborers into our hotel block to work on an Asian Development Bank Project, being carried out by a Dutch Company, to improve the water supply system for Thimphu. Anyone familiar with Hindu morning rituals might know that they involve much splashing of water and, often violent, purging of the upper respiratory tract - all at the break of dawn. This I could tolerate, until the workers began their "hammer and chisel" concrete removal to prepare channels for water pipe installation that continued all through the night. The following day I conferred with my hotel manager and he said that they had never been consulted or informed about the project. Early the next night I engaged all of the local hotel night managers and we confiscated the tools of the workers, ashamed (though not so much at the time) at the assumed authority of my white face, and we all had a peaceful sleep. The next day as I was having breakfast I saw a very large, blond-haired and obviously Dutch, angry, "red-faced white guy" come in to confer with the desk, and the manager

pointed to me. He came stomping across the room but before he could say anything, I said I was a World Bank official and I was aware of the terms of his project (pure bluff). I said under the terms of the ADB project his company had the responsibility of arranging alternative accommodation for all hotel guests inconvenienced by construction activities after 6:00 p.m. and to compensate hotel owners for their loss of revenue (more pure bluff). He said he had no money in his budget to do this and grudgingly agreed to cease any further work between 7:00 p.m. and 6:00 am, and I "authorized" the release of his workers' tools. I was the hero of the hotel district but, of course, had to decline the many offers of free drinks and dinners.

I departed for home at the end of June - the beginning of the rainy season, to prepare a first draft of the environmental impact assessment and to begin to organize work on an environmental auditing and monitoring system and on selected codes-of-practice for biodiversity conservation and riparian zone management. I completed a draft of the Environmental Impact Assessment in August and sent copies to the Environmental Section of the East Asian Department of the World Bank in Washington, and to the FAO Office, the Forest Services Division, and the National Environment Commission in Thimphu. I also sent terms of reference for the environmental monitoring/auditing system and the selected codes-of-practice for review and comment.

I returned to Bhutan in October as scheduled and walked into a firestorm. The World Bank Task Manager had been removed and no replacement appointed pending an investigation by the Bank. A response to the Environmental Assessment had been prepared by the FAO Project Manager, which was largely irrational and criticized me for attempting:

> "To take the role of an environmentalist, plant biologist, geologist, silviculturist, engineer, and every other conceivable profession rolled into one which can only entangle him and prevent him from focusing for instance if he did not attempt to be an experienced silviculturist of broadleaf forests he may not have disqualified himself as a consultant by suggesting a silviculture research which is unscientific and impractical and totally ignoring years of observation and experience. Silviculture and other specific jobs should be left to silviculturist and an environmentalist should only point out where the problems are. One of the main principles of forest management is to generate the raw material in a sustainable and regular basis only, which provide the necessary confidence to the industries. Furthermore, as the consultant has based his justifications entirely on the uncertainty of silvicultural systems which is no more relevant makes this exercise futile."

This rambled on for 16 more incoherent pages without really reaching any conclusions except that he didn't appreciate me very much. I was a little miffed, however, that having listed all the "professional" roles I played in the project he didn't at least credit me with saving him considerable money on sub-consultant fees (har, har).

I spent the remainder of this mission: 1. discussing environmental monitoring with staff of the Nature Conservation Section of the Forest Services Division, the Bhutan Forest Institute, the National Environment Commission, Bhutan Environmental Trust, and World Wildlife Fund;

and 2. conducting field work with Deki Yonten and K.D. Chamling on the environmental monitoring framework and on two examples of management guidelines: riparian zone management and biodiversity conservation. I returned home at the end of November to complete the writing of all the project documents for presentation in a final mission to Thimphu in the spring of 1996.

I returned to Thimphu in mid-April with final drafts of:

- A Sectoral Environmental Assessment and Framework For Environmental Monitoring. World Bank Financed Bhutan 3rd Forest Development Program;
- Biodiversity Conservation Guidelines for Native Broadleaf Forests in Eastern Bhutan; and
- Riparian Zone Management Guidelines for Production Forest Working Circles in Eastern Bhutan.

In each case I cited Deki Yonten and K.D. Chambling as co-authors, though I wasn't sure at the time whether I was doing either of them much of a favour. I was informed that a meeting was scheduled for May 20 where we would present the results of our work to about 30 people from government, the forest industry and national environmental NGOs. I made a short trip back to Tashigang with Deki Yonten and K.D. Chambling to do some final field-testing of the monitoring framework and the management guidelines and take more photographs, and then returned to Thimphu to prepare for the May 20th meeting.

The meeting was held at the facilities of the Bhutan Forest Institute in Taba just outside of Thimphu. In was chaired by the Joint Secretary of Forestry and included 16 staff from the Forest Management Section; 5 staff from the Nature Conservation Section; 2 staff instructors from the Bhutan Forest Institute; 2 staff of the Policy and Planning Division of the Ministry of Agriculture and Forestry; 3 staff from the Bhutan Logging Corporation; the Director and an ex-pat Environmental Specialist from the National Environment Commission; 4 staff from local environmental NGOs (World Wildlife Fund, Bhutan Environmental Trust and Royal Society for the Preservation of Nature); and 2 reporters from the Bhutan Broadcasting Service.

I was asked to open the discussion with a description of the process, and roles and responsibilities involved in the preparation of environmental impact assessment and monitoring proposals for World Bank projects. I explained that the following sequential process was required by the Bank and had been common in most of the projects I'd been involved in:

1. Approach by the respective country to the World Bank for financial assistance for a proposed development project;
2. Development of a simple project concept with anticipated outcomes for World Bank consideration;
3. Identification, usually through a competitive bidding process, of a competent organization that could be engaged jointly by the World Bank and the applicant country to assist in the preparation of a conceptual project management plan and proposed implementation program;
4. Preparation of the conceptual project management plan and implementation program;
5. Preparation, by an independent consultant or organization, of an environmental and social impact assessment and monitoring program, for the project as proposed, for World Bank and country consideration; and

6. Project modification if required, approval by the World Bank, and subsequent implementation.

I said, as constructively as I could, that in this project the process was not followed and I faulted the World Bank Task Manager for his complete lack of direction. I said that I felt the major problems with the process were:

- There was no evidence that an initial project concept was ever provided to the World Bank;
- There was no competitive process involved, and the reasons that project preparation was sole-sourced to the FAO were never disclosed;
- FAO never seemed to recognize, or attempt to establish, what its role in the process was;
- No conceptual management plan had been prepared as a basis for an environmental and social assessment;
- Several project activities, including road building and initial forest harvesting had begun prior to either a management plan or an environmental and social impact assessment prepared to World Bank standards, in contravention of both World Bank regulations and Bhutanese forest legislation;
- The concept of converting native, old growth, gap-driven forests of high ecological-diversity and wood values, to plantation monocultures was **completely** inconsistent with the World Bank's Operational Directives on natural forest management.

Once I had established this context the remainder of the meeting was very constructive and positive.

About two months later, the World Bank terminated the FAO contract on grounds of non-performance, the FAO Thimphu office was closed, Mr. Chong's contract was cancelled, and the administrative staff returned to Rome. The contract was subsequently re-issued to an Australian forestry consulting company with experience in sub-tropical hardwood forest management and cable logging systems, and which agreed with the conclusions and conditions of the ESIA.

At the end of the meeting Dr. Tshering Tashi of the National Environment Commission approached me to ask if I would meet with him at his offices the next day where he had a proposal to make to me. I went to Dr. Tashi's office as requested and was astonished to meet Grant Bruce of Vancouver's Hatfield Consultants, who I'd had many positive experiences with through the B.C. Mine Development Review Process. It transpired that Grant and his wife Dorothy had been CUSO/VSO volunteer secondary school teachers in Bhutan in a previous life and were fluent in Bhutanese. Dr. Tashi described the project he had in mind and said he had already been in contact with the Asia Development Bank and received support and acceptance of Hatfield as the implementing consultancy. The proposal by the NEC was that I would be the team leader and Grant would be the resident manager of the project.

1996 – 98: Consultant to the Asia Development Bank and the National Environment Commission (NEC), Royal Government of Bhutan

The project would assist the NEC in developing and implementing a national environmental management framework. This framework would include:

- a flexible Environmental and Social Impact Assessment Process;
- a simple environmental permitting process;
- selected environmental (air and water) quality objectives and standards; and
- effluent and emission criteria for selected permitted water discharges and air emissions.

In addition, the project would:

- develop modular environmental training programs for staff of government, private companies and NGOs;
- recommend options for strengthening environmental management in the NEC and priority line ministries;
- recommend institutional mechanisms for effective communication and cooperation between NEC and line ministries; and
- develop a human resources development (HRD) staffing and training plan.

Specific products included umbrella ESIA guidelines and procedures, screening guidelines for various categories of projects, sectoral technical EIA guidelines for energy, agriculture and forestry projects, and ambient environmental quality and effluent and emission standards for domestic and industrial projects.

In addition the project: 1) developed modular environmental training programs for staff of government, private companies and NGOs; 2) recommended options for strengthening environmental management in the NEC and priority line ministries; 3) recommended institutional mechanisms for effective communication and cooperation between NEC, line ministries and private entities; and 4) developed a HRD staffing and training plan for the NEC.

I visited Bhutan four times over the next three years, each time staying with Grant, Dorothy and their enchanting children and doing some great mountain hikes with the family. One rather tense incident occurred, however, when I was preparing for a visit to Bhutan. Shortly before departure, I was contacted by Grant's mother who lives on Salt Spring Island. She said the family was rapidly running out of children's underwear. She asked if I could please take a "consignment" of clothing and children's toys and books out to the family on my upcoming visit. At the same time I received an e-mail from a Canadian male friend in Thimphu saying he was suffering from Canadian bacon withdrawal and would I please bring him some. Of course I agreed, only afterwards having belated second thoughts as I approached Bhutanese customs and immigration at a time of increasing concerns over "pedophile tourism" with my luggage stuffed with several packages of Canadian bacon wrapped in little girls' underwear,

and children's toys/books – a new concept in addiction and perversion? I thanked the Gods and Buddha for no sniffer dogs.

I really enjoyed this project and working with Grant and the always-supportive Dr. Tshering Tashi. It also provided a very useful template for several similar projects in subsequent years.

The people of Bhutan

British Columbia

1997 – 98: Consultant to the Ministry of Environment, Lands and Parks

In association with a co-consultant, long-time friend and colleague Brian Wilkes, developed a framework to guide decisions on alternate or adaptive means by which the Ministry could continue to deliver its core activities and responsibilities in a time of government downsizing and budget constraints. The resulting Adaptive Service Delivery (ASD) Framework:

1. reviewed experience in other jurisdictions;
2. proposed guiding and operational principles for ASD;
3. provided criteria for choosing between three alternatives - direct delivery by the Ministry, partnership delivery with another accountable entity, or devolution of delivery responsibility to an independent entity;
4. provided a list of potential ASD tools appropriate to the Ministry;
5. reviewed the institutional/legal prerequisites for successful ASD; and
6. gave some preliminary guidance to the Ministry on the implementation of ASD.

1999 – 2001: Consultant to the Land Use Coordination Office

With a co-consultant, long-time friend and colleague Daryl Brown, undertook a comprehensive, government-wide assessment of environment monitoring programs (terrestrial, atmospheric and aquatic) for both environmental quality and compliance monitoring. Through a series of interviews with key natural resource decision-makers the study identified: 1) perceived management needs for monitoring information and 2) current monitoring initiatives and evaluated their adequacy in determining trends in environmental condition. The study concluded with recommendations to improve the quality, effectiveness, integration, and reporting of environmental monitoring programs.

2000 – 2001: Consultant to the Habitat Protection Program, Ministry of Environment

Engaged to work with a small program steering group to prepare a compliance and enforcement strategy for fish and wildlife habitat protection.

2003 – 2005: Consultant to the B.C. Land Use Coordination Office

Undertook, once again with co-consultant and colleague Daryl Brown, a government-wide assessment of environmental condition monitoring (terrestrial, atmospheric and aquatic) programs in the B.C. government, as a follow-up to the previous study (see 1999 to 2001 above). This assessment recommended ways in which environmental condition monitoring could be both better integrated between resource agencies, and serve the needs of the Government's recent climate change response initiatives (i.e. the first legislated carbon tax in North America).

Indochina

I've decided here to depart from strict chronological order to deal together with the three countries of Indochina (Cambodia, Laos and Vietnam) because of their common geography and complicated, inter-related histories.

1. Cambodia

Before I get started on the forestry projects I did in Cambodia, let me give some historical perspective on what was the saddest and most tragic country I ever worked in. Maybe I'm just rationalizing, but given its history and the time-frame we had to work in, however hard we tried I never felt that we were contributing to anything that was positive and sustainable. Skip this part if you're already familiar with Cambodian history.

In 1863, after long period of domination by Thais and Vietnamese, Cambodia turned to France and became a protectorate. It was occupied by the Japanese in 1941 but remained under French Vichy administration. France once again became the colonial power after the Japanese defeat. In 1949 political parties were allowed to be formed, a constitution was adopted and the country became independent. In 1952 the King, Sihanouk, dismissed the government and declared a monarchy, but only three years later he abdicated, formed his own political party, held elections, and dominated politics for the next 15 years. In 1970 he was deposed by the Communists, and Cambodia was renamed the Khymer Republic.

Five years later a rogue Communist offshoot called the Khymer Rouge took power, led by Pol Pot who called himself Brother #1. He declared his intention to take the country back to "Ground Zero", by which he meant the country would be completely returned to a basic agrarian society (e.g. the political "purity" of the peasant farmer). Mass expulsions began from the cities and towns to poorly designed and constructed collective farms, which also functioned as "re-education" camps. Construction tools and agricultural equipment were insufficient and adequate rice-crop seed and fertilizer supplies for the new demands were never met. As a result even basic living conditions were inadequate and crop production targets (particularly rice) were totally unrealistic. The result was long hours, working in hash conditions with insufficient food, poor living conditions and brutal discipline. Unsanctioned personal relationships were prohibited, with the slightest infringement resulting in serious punishment or often execution. Anyone considered an "intellectual"– ex-business people, government officials, teachers, anyone who spoke a foreign language (especially French), and, pathetically, anyone who wore glasses were subject to execution. Estimates of the number killed vary widely, but the most commonly accepted figures are that 20,000 people died in the initial forced movements to the countryside, over 1.8 million died of starvation in the collectives/camps, 1.3 million were executed for "anti-social behaviour", and 200,000 "Cambodians with Vietnamese minds" in Eastern Cambodia who rebelled against Khymer Rouge authority were massacred, and buried in mass graves – in total 3.32 million people from a population of 7.8 million, or about 43% of the population.

The Vietnamese invaded Cambodia in 1978, and very quickly over-ran the country, scattering the Khymer Rouge. They occupied the country, systematically eliminating the remaining Khymer Rouge, until 1991 when they withdrew under the terms of the UN-sponsored Paris Peace Accord. The UN assumed responsibility for disarming the remaining rival factions, enforcing a cease-fire, and preparing the country for elections held in 1993.

The UN, World Bank, Asia Development Bank, with the assistance of many international NGOs, began the long process of rebuilding a functioning Government and civil society. This has proved very difficult and may yet take several generations to complete. When Pol Pot said he wanted to take Cambodia "back to ground zero", I think he exceeded even his own expectations. He totally destroyed the social fabric of the country. I've never been in a country where there seemed to be so little sense of broader community and a common social purpose. Understandably I guess, given what they'd been through, individual people's sole preoccupation seemed the short-term interests of themselves and their immediate family.

In 1991 Government introduced industrial concessions as the main instrument of commercial forest management. However, instead of creating a clear legal context for the commercial concession system, the Government simply superimposed in on the existing domestic permit system with no additional conditions, which was totally inadequate. The first concessions were granted in 1994, and by 1997 33 concessions had been granted covering over 7 million ha. of forest land. However, this whole process of delineating the concessions and establishing their terms was done without any reliable forest resource inventory information. The period from 1994 to 1998 was one of significant uncontrolled and illegal logging activity, which had serious implications for the long-term viability of Cambodia's forests and the newly established concessions.

Given this background of what can only be termed forest anarchy, the Cambodian Government approached both the World Bank (WB) and its sister agency the Asian Development Bank (ADB) for assistance. The World Bank agreed to begin preparation of a national forest planning and management framework, and the ADB agreed to conduct a comprehensive, critical review of the Forest Concession System. Subsequently I participated in both activities.

1998–2003: Consultant to the World Bank as Forest management and environmental specialist providing assistance to the Royal Cambodian Government in developing a forest concession management, planning and control system

I'm not sure how I got involved in this project, but once again I think Tony Whitten may have been responsible. The Project Manager was Bill Magrath, and this was the beginning of a long, productive and interesting relationship with Bill and his wife Susan Shen where, according to Bill, they often planned my life for the next few years over the breakfast table. (Sounds intriguing? Stay tuned!).

Bill was a natural resource economist with degrees from U of Michigan and Michigan State. His primary focus in the Bank has been bi-lateral forestry projects, primarily in Southeast Asia. However, one very intriguing project early in his career was to manage one of the world's largest and most expensive single-purpose forest fire prevention and suppression programs. It was in the Ukraine and its sole purpose was to ensure that the large forest areas down-wind of the failed Chernobyl nuclear reactor didn't catch fire and spread radio-active wood smoke and ash over Western Europe – no pressure there!!

As noted above the initial intent of the Cambodian project was to develop a comprehensive forest planning and management system for the industrial forest concessions. A New Zealand consulting firm had been engaged and had been working on the project for 18 months, when the contract called for a first draft of a final report. Instead of a "comprehensive forest planning system", the best the consultant came up with was a set of generic operational logging presciptions that could have been "pulled off the shelf" in a couple of weeks. The result of this was that Bill, understandably, "pushed the panic button" and pulled together a team to expand and complete the project. I was engaged as silviculture and biodiversity specialist, along with land use planning, logging/forest engineering, and community engagement consultants.

We all assembled on the first day of the mission, and Bill called us together in Phnom Penh's "Foreign Correspondent's Bar" (made famous in many Vietnam War era movies). He started out by reinforcing a number of "quintessential" tasks that we had to perform. When he finished, he asked us each to state what our most immediate objectives would be for the coming week. I thought this was a little "school-marmish" and when it came to me I said that my most immediate objective would be to try to introduce the word "quintessential" into a casual conversation. There was an audible gasp, and then Bill slid his little half-moon, granny glasses down his nose and, with the meerest hint of a grin, said "You know Dick, I might really learn to dislike you!" – and I knew that we were "a match made in heaven".

One of our first objectives was to obtain from several concessions copies of their management plans, which were required before they could have begun harvesting operations. These were

incredibly poor, “boilerplate” documents that provided no guidance for forest management or for compliance and enforcement. We asked the concessionaires where they came from and were stunned to be told that the Forest Department insisted on preparing the plans and being paid for them before the concession could begin operation. We immediately forced the Department to discontinue the practice and require that all concessions re-submit management plans prepared by competent, independent consultants to comply with the new forest management, planning and control system. Given the lack of in-country consulting competence we used ADB resources to provide a list of international forestry firms in the region who could be engaged by the concessions to partner with emerging Cambodian consulting companies to improve local capacity. The Forest Department was very annoyed that we had cut-off this source of personal revenue. Bill reminded the Director that the job of the Department was to monitor and enforce compliance with the new regulations and prevent forest theft, and that the project had provided four new vehicles to facilitate monitoring and enforcement of forest activities, and maybe (in polite terms) he and his staff should get their “***es” out of the office and do their jobs. The Director’s ears “pricked up” but I suspected it was just because he saw a new alternative opportunity to graft the system.

We were actually a really good team and in the next few weeks produced:

- Operational forest management and harvesting codes-of-practice;
- Strategic forest planning handbook;
- Silvicultural and forest harvesting guidelines for biodiversity conservation in the managed forest; and
- A Guide to the necessary linkages between forest planning, environmental codes-of-practice, and the newly developing national Environmental Impact Assessment Process.

A second phase of the project, initiated in late 1999, aimed to strengthen forest concession regulations, prepare a template for forest concession management plans based on recent much-improved forest inventories, and provide training to government forestry staff in management plan review, approval, monitoring and enforcement. During this phase, I drafted a new forest concession planning and control regulation (sub-decree), and terms of reference for a subsequent World Bank project.

The biodiversity guidelines were expanded in collaboration with the Wildlife Conservation Society (WCS) and a demonstration/training exercise aimed at forest concession and government technical staff was delivered in cooperation with WCS. The final step of this project was to prepare a section on biodiversity conservation for the developing Cambodian Forest Planning Manual.

1999 – 2000: Consultant to Fraser-Thomas Ltd., Aukland, New Zealand to participate in an Asia Development Bank funded evaluation of the Cambodian Forest Concession System

I functioned as Forest Concession Management Specialist on this project to undertake an independent evaluation of the performance of twenty-two of the existing forest concessions. Concessions were evaluated in terms of their compliance with contractual and legal obligations, and with generally accepted standards of sustainable forest management. The team also evaluated the short to medium term viability of the concessions in view of the substantial illegal harvest that had taken place over the previous five years. In summarizing the state of forest anarchy that had occurred during the previous decade I wrote the following conclusion (which I never expected would be retained in the final document - but was):

> "It cannot be over-stressed that no one entity is to blame for the crisis situation that has arisen in Cambodia's forests. It is the result of a TOTAL SYSTEM FAILURE, resulting from greed, corruption, incompetence and illegal acts that were so widespread and pervasive as to defy the assignment of primary blame. Responsibility for this debacle must be shared by national and provincial politicians, government forestry departmental staff, the police and the military, concessionaires, private businesses and individuals, and by individuals and commercial entities in the neighboring countries of Thailand, Vietnam and China."

2. Laos

2001 to 2012: Consultant to the World Bank to prepare an environmental and social impact assessment, on behalf of the Peoples Democratic Republic of Laos, for the proposed Sustainable Forestry and Rural Development (SUFORD) Project

This project followed from a very successful pilot project funded by the Bank and the Government of Finland (GOF) and would expand the application of this village-based sustainable natural forest management concept to other areas of southern Laos. An environmental and social impact assessment would be required for World Bank loan appraisal, and would be based on a feasibility-level project design – and these were to be my primary responsibilities.

Of all the projects I did for the Bank, SUFORD was my favorite. As a community forestry project, it was the only example in Southeast Asia of commercial tropical rainforest management carried out as a partnership between a Ministry of Forests and local indigenous communities. In 1995 the Government of Laos (GOL) looked around the region and decided that industrial concessions were not its first choice of a forest management model. It had a State Forest Enterprise that had carried out low-level forest harvesting (largely "creaming"), but it recognized that it had outlived its usefulness. The GOL approached the World Bank (WB) and the Government of Finland (GOF) to pilot a program of community forest management to conserve forest values and enhance the welfare of local, forest-dwelling communities.

The WB and GOF jointly provided $2.5 million of grant funding (which Laos didn't have to pay back) to implement two pilot projects in the southern provinces of Savannakhet and Champasak. The pilots got underway in 1996 and finished in 2001. At that point the GOL approached the WB and GOF and declared its intention to take a Bank loan to implement community forest management in six southern provinces, representing 60% of its commercial forest area. This was the point that I became involved because I was hired to do the environmental and social impact assessment required under WB regulations. The new project was approved in 2002 with GOF providing grant funding for technical assistance. As previously described, WB has a rigorous project evaluation process involving annual audits and a mid-term review. I participated in all of these to evaluate whether the project was meeting its environmental and social commitments. The final annual audit was in November 2008 to coincide with the project's completion. We all had a little celebration and sadly said farewell to our "ideal" project. In December the GOL approached WB and GOF with the proposal to take another loan to bring 80+% of its commercial forests under community management by 2015, so I went back to Laos in March as part of a WB team to begin the process of designing a project extension into the northern mountains of Laos (more about this later).

Here are the reasons why this project is so special:

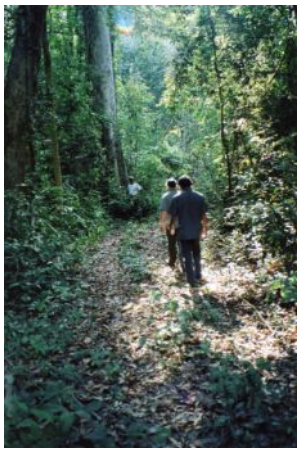
- It's the first time, in my experience, that intact tropical rainforest is being commercially managed in partnership by a forest administration and local communities (as you might imagine there was considerable resistance to this from certain elements in the forestry administration and it's a tribute to GOL and some very dedicated foresters that the project happened).

- Early on, significant resources were provided to train villagers in simple forest management techniques – forest inventory, growth studies and tree selection prescriptions, simple participatory forest management planning, and in reaching consensus between communities on community forest boundaries. As an incentive for this to happen, the GOL/World Bank provided a one-time grant of US$8,000 to the village development fund of each forest community - $3,000 when the respective village forest boundaries were agreed-to and a management-level inventory completed, and $5,000 when a participatory management plan was prepared and approved.

- The management plans are completely participatory and there must be a village consensus in approving the plan. The process makes provision for the delineation of "high conservation value forests" (HCVFs), which can include spiritual forests, important non-timber forest product (NTFP) areas, watershed protection forests, and areas of high biodiversity.

- Sustainable timber harvests are determined in a series of steps. An initial, participatory, 15% management-level inventory is carried out to estimate total standing tree volumes by species, to provide a basis for estimating a maximum permissible level of harvest, and to divide the village forestry area into equal annual harvesting coupes. The actual level of harvest is determined by a 100% inventory of all trees over 30 cm in diameter on each annual felling coupe. Trees are selected for harvest through the application of a set of common-sense rules intended to maintain species composition, stand structure and ecological keystones, and to limit gap-size.





Forest concessions in Laos

- What makes the project work is that decisions on which trees to cut are made by the villagers themselves. One of the major economic values in these forests for villagers is the tapping of damar resin (for very high-end furniture finishes) from Dipterocarp tree species that also happen to be some of the prime commercial timber species. In other countries (Cambodia, for example) uncontrolled commercial forest harvesting activities have destroyed community livelihoods by taking resin trees without consultation or compensation. In SUFORD, villagers have absolute control over whether and when resin trees should be cut and are given compensation if they decide to allow harvest. Current wood harvests are 0.5 to 2 trees per ha per felling pass (20 years) as opposed to the 6 to 8 trees per ha common on commercial operations elsewhere in the region. The implications for the ability to restore degraded rainforests and preserve carbon retention over time under community management are obviously very significant.

- Benefit/revenue sharing between Governments and villagers occurs according to an agreed-to formula (though we had some problems limiting the Finance Ministry's greed). The current formula is that, after payment of royalties, net revenues are split as follows: 5% to the national forest administration; 5% to the provincial forest administration; 45% to the district administration, from which all management costs, including the wages of villagers who actively participate in forestry activities are paid; and 45% to the village development fund.

- In 2007, after several independent project audits, the international Forest Stewardship Council (FSC) agreed that there was sufficient consistency in the program that the whole project would be certified a "sustainable forest" under one certification (previously each community forest area was separately certified, which was hideously expensive). This greatly enhanced the desirability of Laos timber to European furniture manufacturers.

- I was asked recently what would have happened if a community decided to simply liquidate its forest and take the money. This wouldn't have been allowed because the forests were still technically under the jurisdiction of the national government, and the community was still bound by an approved management plan. I think it's unlikely to happen for another reason. I went to one village with one of our community liaison consultants and asked her to explain to them that we thought they lived in such a rich forest area that they could increase their 20-year rotation harvest from 1-2 trees per ha to maybe as high as 3-5 trees per ha. After considerable community discussion the village chief replied through our interpreter that while they appreciated the advice, they didn't want to do this because "it wouldn't be beautiful". Then the interpreter said, "Wait, beautiful is not the right word – it's close – but it means something closer to function". It's the first time I had confirmed something I'd always suspected – that these communities who have lived in these ecosystems for centuries have a mental template of what constitutes a "beautiful, functioning forest".

Laos villagers

In 2009 I was asked to prepare an environmental and social assessment for an extension of SUFORD. The new project would move from the moist lowland forests of Southern Laos to drier mixed deciduous forests on rather steeper terrain in the Annamite Foothills of north-central Laos - an area with a much more complex mix of indigenous ethnic groups. I returned to Laos in advance of the main party and proceeded to the provinces of Bolikhamxi, Vientane, and Xayaboury to find suitable forest areas for the proposed extension.

We started in Xayaboury, drove around the periphery of the first forest reserve proposed for consideration and saw nothing but scrub-bamboo on the lower slopes. I was assured that there were forests in the interior of the reserve and we set out on what became about a 16-kilometer walk through the steepest slopes I'd ever been on that weren't rock. The Lao don't do switchbacks and we walked straight up to the top of the ridge. Somewhere along the way I felt a serious pain in my right calf but there was no alternative but to press on.

We got to the very top of the ridge and the leader of the group said "See, there are forests over there" and he pointed to three ridges away. I asked if there were roads into that area and he replied no. I explained that the World Bank's policy was that roads would not be constructed into roadless forest areas, until there was a forest management plan and a demonstrated local law enforcement capacity to prevent illegal harvesting – and that was the end of the discussion. The leader of the Lao team said that we would have to descend down the back of the ridge and walk out along the stream in the next valley to the village where we would be meeting our village consultation team. So we slithered and fell about 300 m to the valley bottom and then walked about 8 km along the stream with a coarse cobble bottom to the village. By the time we arrived I knew that I had done something pretty serious to my leg.

I was sent to a World Bank-recommended doctor when we returned to Vientiane, and he diagnosed a torn calf muscle. He said there was a large hematoma in the calf and recommended I wear an elastic stocking on my air trip home and thereafter until the swelling went down and the pain disappeared. Several months later I didn't think things were improving and so I asked my G.P. for a referral to a specialist. When I finally got in to see someone he asked me, with typical specialist tact, what I expected to get out of the consultation. I explained what had happened and that I couldn't seem to rebuild strength in my inside calf muscle. He said that I could only do that if I had an Achilles tendon in that leg. I said "What!?!" and he replied "Yup, I can sit here across the room and see that you have no functioning Achilles there". I asked if there was anything that could be done and he replied that he could take a piece of tendon out of my hip, graft it to my ankle, fish the Achilles tendon down from where it had retracted to, and attach it to the piece of tendon. But, as he explained, "That would be a 12 year rehabilitation. You're 70 years old and have pretty fair mobility. Do you really want to do that to yourself at your age for an uncertain outcome?" So that was pretty much the end of my active field career.

3. Vietnam

Vietnam is estimated to have had a forest cover of 45% (approximately 146,000 km^2) in 1945. The next 30 years saw almost unrelenting warfare and by 1975 intact primary forest cover had fallen to about 19%, largely along the higher elevations of the Annamite Mountains. Much of the deforestation was the result of carpet-bombing and defoliant spraying (see below), and "tactical clearing" by American forces during what the Vietnamese refer to as the "American War". After the Vietnamese victory, wood harvesting for national reconstruction further reduced primary forest cover (evergreen and semi-evergreen rainforest) to about 17%. In addition, about 12% vegetation cover is in some form of natural secondary

successional vegetation, much of this with important residual native biodiversity that is relied on by local people for domestic livestock fodder and the collection of non-wood forest products.

In early 2002 I was contacted for the second time by Susan Shen (Bill Magrath's wife - see China below) and asked if I would be able to participate in a proposed forestry project in Vietnam. The project was to be called the Vietnamese Forest Sector Development Project (VFSDP) and was to involve:

1. plantation establishment and natural forest rehabilitation in the four central provinces of Vietnam (Thua Thien Hue, Quang Nam, Quang Ngai and Binh Dinh), and
2. improved management of selected protected areas country-wide.

My primary task would be to prepare the required environmental impact assessment for the current plantation component, and propose environmental guidelines to enhance plantation sustainability and protect and rehabilitate native degraded forest communities

I travelled to Vietnam in September in advance of the main project team and was taken on a tour of the four provinces by four young foresters from the Vietnamese Forestry Institute. It soon became apparent that the objectives of the tour were twofold: first, project orientation; and second, to see what they could get "whitey" to eat. Basically, in Vietnam if it walks, crawls, flies, slithers, squirms, swims, or just rests on the ocean bottom – it is food. Over the next ten days I ate sea urchin, several species of raw marinated finfish, sea snails and bi-valves, very large land snails, deep fried silk worms (creamy/crunchy texture), snake (very chewy), and the "piece de resistance" – small song birds marinated in a spicy, soy-based sauce and deep-fried to crispy perfection (one removed their little legs and then used their little beaks in lieu of an "hors de oeuvres" stick). I think I earned some "brownie points" by eating every thing put in front of me (though a good slug of beer sure helped a few times).

The tour of project areas was very instructive. Vietnam in the mid-1980's was starved for wood products and the Central Government began a significant government/industry plantation program utilizing exotic wood species, primarily several *Eucalyptus* species and *Acacia mangium* – all native to Northern Australia and New Guinea. Some of these plantations were managed for construction wood, but most were providing feedstock for pulp and paper plants in Vietnam, largely to produce toilet paper for both domestic use and export - primarily to China and Japan. The latter plantations, many with Chinese and Japanese investment, were planted after brutal site preparation, at very high densities, and expected to produce wood volumes of 60 – 80 m^3/ha per annum on successive 8-10 year rotations – a certain recipe for total site degradation on these fragile, already abused, tropical soils.

However the Vietnamese are very clever and creative people, and of much more interest to me were many local private initiatives to use Acacia mangium (which is nitrogen-fixing), as a short-term, commercial, "nurse-crop" for higher-quality native hardwood species such as *Dipterocarpus, Parash*orea and *Hopea* to be managed on a longer-term (40+ year return)

selection harvest system. It was these private, locally-initiated experiments that provided me with a model for the project. I completed the Environmental Impact Assessment and Environmental Protection Guidelines for Plantation Management, and submitted them, respectively, in August and October 2003.

In 2008 I was asked to return to Vietnam to conduct a mid-term project assessment of the extent to which the environmental protection guidelines prepared in 2003 had been implemented in the VSFDP. This assessment concluded that implementation had been "uneven" in several respects and laid out what would be required if the project were to continue to be funded. It identified the most critical environmental and silvicultural activities to be implemented, and prepared an Action Plan on: 1) measures to be taken to ensure adequate implementation of project environmental guidelines, including plantation sustainability and diversity in future plantations; and 2) measures to improve and rehabilitate already-established, single-species plantations in order to minimize potential economic and ecological risks, increase species diversity and plantation productivity, and enhance carbon capture and sequestration at the site, stand, and landscape levels.

People's Republic Of China

1999 – 2001: Consultant to the World Bank: Environmental impact assessment specialist engaged by the World Bank on behalf of the Chinese State Forestry Administration to prepare an environmental and social impact assessment statement for the World Bank/European Union/Chinese Government Sustainable Forest Development Project

The project followed from the 1999 natural-forest logging moratorium and a newly-conceived Natural Forest Protection Policy (both a response to the disastrous flooding in 1998 in the Yangtse and Yellow River Basins). The project consisted of three components: 1) natural forest management; 2) protected area management; and 3) wood/fibre and tree-crop plantations. My primary task was to prepare the environmental and social impact assessment required for World Bank loan appraisal, based on a feasibility-level design for each project component. Over the two and a half years of this project I was able to visit China on four missions, each of approximately three to four weeks.

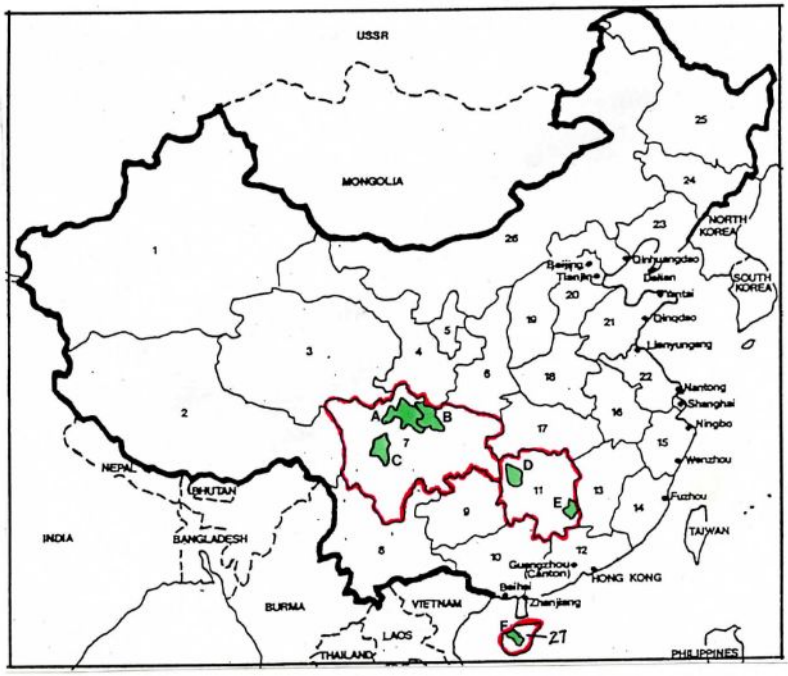
This was my first project with Susan Shen (Bill Magrath's wife) as my Task Manager (also see Vietnam above). It soon became clear that Bill and Susan were quite different managers though both supremely effective in their own way. Where Bill was pretty laid-back, Susan was rather more intense. On write-up days, when we were all hunkered down in our hotel rooms writing our parts of the final report to her deadlines, she'd phone every hour or two to

ask how things were going. One was tempted to say that, “Things would go much better if you’d stop interrupting my train of thought!!” At one point she asked me why I didn’t have a cell phone. I asked, “Why would I want a cell phone?” She replied, “So I can contact you any time I need to!” I said that I thought that was a pretty good reason why I didn’t want a cell phone. She was not amused!

I was very fortunate to have, as my social assessment partner, a French woman Claude Saint-Pierre-Bales who, initially unknown to the Chinese, was a fluent Mandarin speaker. She was always able to get some great “intel” on the Chinese perspectives about the project just by keeping her ears open, before she had to “blow her cover”.

The Natural Forest Management Component focused on six small areas in Sichuan, Hunan and Hainan provinces (reflective of how little natural forest remains in China).
The Protected Area Management Component focused on seven small, Protected Sites in Gansu (1), Sichuan (2), Yunnan (1), Guizou (1), Hunan (1) and Hainan (1) Provinces. The Plantation Component focused on eleven provinces: Liaoning, Hebei, Shandong, Shanxi, Henan, Anhui, Hubei, Hunan, Sichuan, Hainan, and Gansu.

Though as a team we visited all the project areas at least once, my particular priorities were the Natural Forest Management Component and the Plantation Component - the former to determine if the management and protection regimes proposed for these areas were acceptable; and the latter to assess the potential environmental impacts of converting from current land condition to intensive plantations, and to ensure that plantation tending activities such and thinning and pruning were incorporated into the management plan. A very late addition to the Plantation Component was a horticultural tree program (fruits and nuts) to provide more immediate cash flow to villages in order to supplement the longer-term returns of timber production. Because these are obviously more susceptible to insect and disease attack, I was asked to assess integrated pest control programs and pesticide use in the context of World Bank environmental policies.



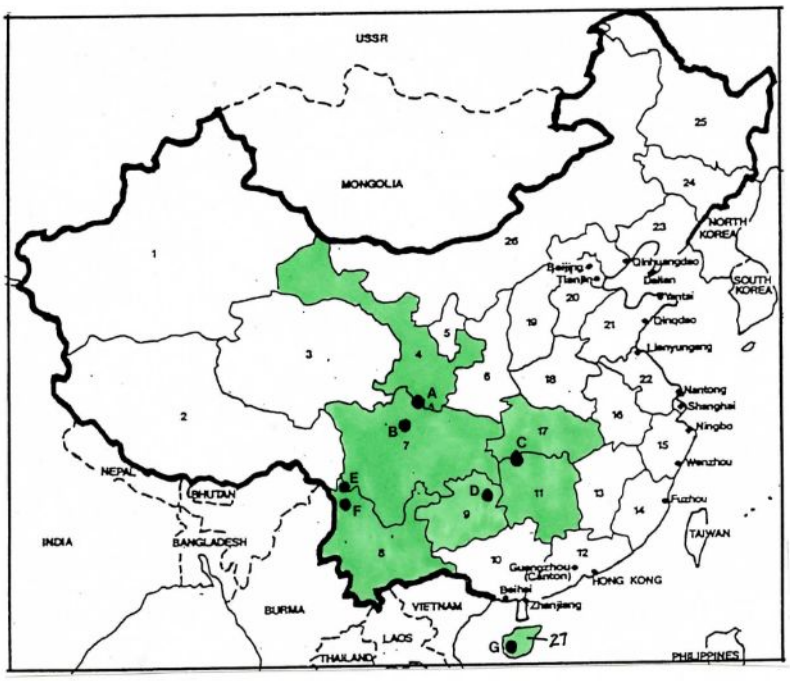
Natural Forest Management Component Showing Participating Provinces (red border) and Counties (light green).

Sichuan Province
A. Songpan County
B. Pingwu County
C. Baoxing County

Hunan Province
D. Yongshun County
E. Yanling County

Hainan Province
F. Changjiang County

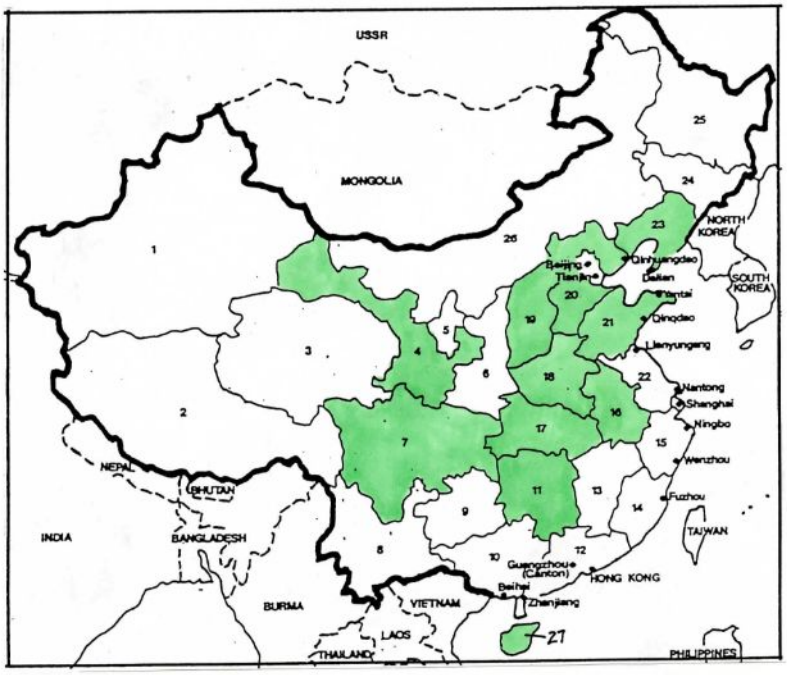
1. Xinjiang Uygur A.R.
2. Tibet A.R.
3. Qinghai Province.
4. Gansu Province.
5. Ningxia Hui A.R.
6. Shaanxi Province.
7. Sichuan Province.
8. Yunnan Province.
9. Guizhou Province.
10. Guangxi Zhuang A.R.
11. Hunan Province.
12. Guangdong Province.
13. Jiangxi Province.
14. Fujian Province.
15. Zhejiang Province.
16. Anhui Province.
17. Hubei Province.
18. Henan Province.
19. Shanxi Province
20. Hebei Province
21. Shandong Proninces.
22. Jiangsu Province.
23. Liaoning Province.
24. Jilin Province.
25. Heilongjiang Prov.
26. Inner Mongolia A.R.
27. Hainan Province.



Protected Areas Management Component Showing Participating Provinces (light green) and Project Sites (black dots).

A. Motianlin Nature Reserve Cluster
B. Minshan Nature Reserve Cluster
C. Wulingshan Nature Reserve Cluster
D. Fanjingshan Nature Reserve
E. Baimaxueshan Nature Reserve
F. Nujiang Nature Reserve
G. Jianfengling Nature Reserve

1. Xinjiang Uygur A.R.
2. Tibet A.R.
3. Qinghai Province.
4. Gansu Province.
5. Ningxia Hui A.R.
6. Shaanxi Province.
7. Sichuan Province.
8. Yunnan Province.
9. Guizhou Province.
10. Guangxi Zhuang A.R.
11. Hunan Province.
12. Guangdong Province.
13. Jiangxi Province.
14. Fujian Province.
15. Zhejiang Province.
16. Anhui Province.
17. Hubei Province.
18. Henan Province.
19. Shanxi Province
20. Hebei Province
21. Shandong Proninee.
22. Jiangsu Province.
23. Liaoning Province.
24. Jilin Province.
25. Heilongjiang Prov.
26. Inner Mongolia A.R.
27. Hainan Province.



Plantation Establishment Component Showing Participating Provinces (light green).

1. Xinjiang Uygur A.R.
2. Tibet A.R.
3. Qinghai Province.
4. Gansu Province.
5. Ningxia Hui A.R.
6. Shaanxi Province.
7. Sichuan Province.
8. Yunnan Province.
9. Guizhou Province.
10. Guangxi Zhuang A.R.
11. Hunan Province.
12. Guangdong Province.
13. Jiangxi Province.
14. Fujian Province.
15. Zhejiang Province.
16. Anhui Province.
17. Hubei Province.
18. Henan Province.
19. Shanxi Province
20. Hebei Province
21. Shandong Pronince.
22. Jiangsu Province.
23. Liaoning Province.
24. Jilin Province.
25. Heilongjiang Prov.
26. Inner Mongolia A.R.
27. Hainan Province.

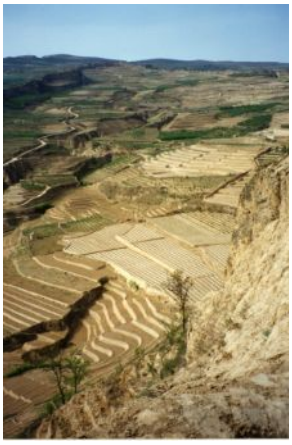
To provide a bit of historical context to the current project, from the early-1980s onward the World Bank had funded commercial timber plantations in China to alleviate anticipated future construction wood shortages. Unlike earlier plantation projects, this assistance included funding for ongoing thinning and pruning. China was influenced at this time by the views of Trofim Lysenko, a Russian agronomist and geneticist who mixed scientific prescriptions with Communist philosophy. He contended, amongst other biological absurdities, that tree crops should be planted at very high densities (600 to 1000+ trees per ha instead of the more common 400 to 500) and the trees, like the "Great Soviet Proletariat", would support one another as they grew. Of course they didn't, and China ended up with large areas of over-crowded, stagnating plantations. Because the original loans had already included thinning costs, and that money had simply been used to plant more stagnating trees, the Bank could not provide additional funding (though the present project included a small experimental thinning project on very specific areas to determine whether some of these plantations would even be able to respond to belated thinning). I was to make certain that thinning operations were included in the new management plans to ensure this mess didn't happen again.

Two of the most memorable field trips on this project were to the Tibetan areas of northern Sichuan Province and to Gansu Province on the border of Inner Mongolia. Northern Sichuan is just to the east of Tibet. There are many Tibetan communities straddling the border and thus we were able to get a taste of the unique Tibetan culture without the hassle of trying to get permission to enter Tibet. The area is very mountainous and still retains some spectacular spruce and fir forests.

Tibetan women; John with 'a friend'

Gansu stretches along the entire northern border of Tibet and its provincial capital Lanzhou was the eastern terminus of the historic Silk Road. It was of particular interest to me because I'd travelled so much of the western stretches of the Road (Kabul to Istanbul) and this "connected the dots". Much of Gansu is located on the Loess Plateau, which is one of the world's most unique landscapes. Loess is a term referring to deposits of wind-blown soil, generally in drier climates. The Loess Plateau was formed over geological time by gigantic dust storms, originating from the semi-deserts of Inner Mongolia that created deposits up to

250 m thick. The upper loess deposits are pale yellow in colour and account for the name of the Yellow River (Huang He) that flows through, and has down-cut, the plateau. One of the most amazing features of this system is that the river continues to erode and undercut the deposits causing them over time to slowly collapse downward in large blocks of up to several hectares in size, kind of like a large slowly-descending escalator. These loess soils are very fertile and have been farmed for many centuries, with farmer families riding the blocks downward over many, many years, and when they reach the river they, or more realistically their descendants, go back to the top of the escarpment, pick a new block and start the ride again – an astonishing system!



On every provincial visit there was an "orientation meeting" and a banquet hosted by the Provincial Governor. The three main "features" of the banquets were:

1. large quantities of incredibly wonderful local (regional) foods;
2. large quantities of "mautai baijiu", the most famous alcoholic beverage of China, distilled from a fermented mixture of sorgum and peas, and described by one western

food critic as “tasting of rotten cabbage, ethyl alcohol and paint thinner, with solvent and barnyard overtones”; and

3. incredibly lavish gifts for each of us “guests” - my two favorites being a beautiful reproduction of the famous bronze “Heavenly Flying Horse of Gansu”, and a 20 foot detailed, roll-up, hand painted silk tapestry of the history of the port city of Qingdao.

One of the things I noticed on these regional trips, particularly in the western provinces with diverse ethnic minorities was the way in which the Han Chinese restaurant/hotel owners exploited the local ethnic peoples’ cultures for the tourist trade – what I describe as the “ethnic singing/dancing waitress” experience. At one point in the meal, all the waitresses would disappear and return in ethnic costumes to dance and sing before returning in their waitress uniforms to clear the tables and serve desert. I have always believed that ethnic minority peoples should have the sole right to interpret and benefit from their own culture, and this experience was a great introduction to my next project.

2004 to 2005: Consultant to the Canadian International Development Agency (CIDA)’s Public Policy Options Program providing assistance to the government of Deqin Autonomous Tibetan County, Yunnan Province.

This project was designed to provide assistance to the government of Deqin County, in developing a strategic plan for environmental protection, and environmentally and culturally sustainable tourism development. This CIDA project was being implemented by Dr. Bruce Fraser, an old school-mate from the UBC School of Forestry. Bruce had taught forestry at Selkirk and Malaspina Colleges for many years before setting up a consulting business where he worked both internationally, and domestically for the B.C. Forest Service, on public consultation programs. Bruce had just begun this project when he was offered the position of Chair of the Provincial Forest Practices Board. We had kept in contact over the years. He was aware of my work in China and asked me if I would take over the lead on the project. Of course I said yes. My co-consultant on this project was Russ Hawes, a colleague of Bruce’s on a short-term secondment from the Forest Practices Board.

To set the geographic context: Deqin is an autonomous Tibetan county of Yunnan Province in southwestern China. Deqin’s small northern border is with Tibet, it has a short western border with Myanmar, and it contains the headwaters of two of Southeast Asia’s major rivers: the Salween and Mekong. It is extremely mountainous, with most of the County above 3300 m elevation in two main mountain ranges: the Meili and Baimang Snow Mountains. It claims to be the closest place in reality to the legendary Shangri-La of James Hilton’s novel “Lost Horizons” – and it really is that enchanting! The people are Buddhist and there are many temples, monasteries and other religious sites. They are also a horse culture, with horses being the major form of off-road transportation and local people were just beginning to offer a nascent trail-riding tourist opportunity.

The first task was to arrange two study tours, each of about 12 people, of B.C. and Western Alberta to look at relevant outdoor recreation facilities and First Nation's cultural facilities. As I mentioned above, I had been appalled at the way that Han Chinese business people in Western China had exploited local cultures for tourism. I've always felt as a matter of principle that indigenous peoples must have the sole right to interpret and benefit from their own cultures. For this reason I consulted with Dr. Nancy Turner, the ethno-botany professor at the University of Victoria for her ideas on the best First Nations cultural, tourism and community development examples in Southern B.C. and western Alberta. We agreed that outdoor and cultural activities of the Shuswap in the Fraser/Thompson, First Nations activities associated with the Calgary Stampede (Siksika (Blackfoot), Stoney and Tsuu Tina), the Ktanaxa Centre near Kimberley*, and the Inkameep Centre at Osoyoos would probably be best. We arranged for representatives at each Centre to speak about the particular challenges that indigenous peoples face in developing culturally appropriate tourism and community development activities. We also contacted trail-riding and river-rafting operators in the central interior to organize presentations on important considerations (facilities, food, equipment, staff training and safety requirements) in establishing these commercial tourism operations. Both tours were to end in Victoria where I had arranged for presentations by staff of the Ministries of Environment, Health and Tourism on environmental and public health regulations appropriate for community-regulated backcountry recreation facilities.

We confirmed through CIDA that two tours would be organized, one in June/July of 2004 and the second in June/July of 2005. Each of these two Chinese/Tibetan delegations was to consist of six Tibetans from Deqin County and six Han Chinese from a quasi-governmental Socio-Economic Planning Organization in Beijing. The first tour was pretty much of a disaster. Deqin people were great and surprisingly spoke very good English (missionary-educated), far better than the Beijing bureaucrats. The Beijing group were largely disinterested and spent most of the time whether travelling or in meetings either sleeping or in loud disruptive conversations in Mandarin. It was reminiscent of some of our Indonesian experiences where foreign "study tours" were seen as a "perk", and an opportunity to party and for duty-free shopping.

* The Ktunaxa Centre is a First Nations cultural/tourism project featuring a luxury hotel and recreational development on the old St. Eugene Mission in the Kootenay River Valley near Kimberly. It was a Federal Government "Indian Act" residential school operated by the Anglican Church from 1912 to1970 as part of a National program that separated First Nations children from their families, cultures and languages for "educational purposes". Over 5000 First Nations children from B.C. and Alberta passed through St. Eugene

during its almost 60 years of operation. After it's closing in 1970 there was a fierce debate in the Ktunaxa community over its future, with many school survivors arguing for its demolition. Two women, Chief Sophie Pierre and Mary Paul, led a movement within the community to save the facility and use it as an opportunity for community healing and development. It now features a world–class resort hotel, a Jack Nicolas-designed golf course, and access to summer water sports on local lakes, and winter sports on the nearby Kimberly Ski-hill. The entire basement of the building is dedicated to an interpretive centre on the history of the Residential School System.

Towards the end of this first tour we had stopped for lunch in Princeton, when the leader of the Deqin group came up and said that the female Beijing leader would like to speak to me and had asked him to translate. She said that the Beijing group did not find the tour interesting or useful and she suggested that the second tour spend most of its time in Vancouver and Toronto. I asked the young Tibetan to translate exactly what I was going to say and to make sure that she was aware that that was what was happening. I said that there was nothing that could be learned relative to the agreed-to objectives of the tour in Vancouver or Toronto, and the Canadian taxpayer doesn't pay for international shopping trips. I said that most of the Beijing group appeared to have no interest or background in the subjects of the tour and so should never have been selected in the first place. I said for the next tour we would expect to see resumes for all proposed participants indicating their areas of expertise and interests, and how those related to the objectives of the tour. The second tour in June of 2005 was a huge improvement and we got some really sharp, relevant and interested people from the Province and the Communist Party (as opposed to the moribund Beijing government bureaucracy).

The final act of this saga was a real treat because Russ Hawes, his wife Nancy and I were invited to return to Deqin for 10 days. We were treated royally and got to go on a magical 4-day trek into the mountains. I'd say horse trek, except that would be an insult to my noble steed. I had a mule and was so impressed - calm, smooth, sure-footed and surprisingly friendly. I'll take a mule over a horse any day (sorry, Rachel).

From left – headwaters of the Mekong River, temples in Dequin, John's mule

Mongolia

2003: Consultant to the World Bank and the Government of Mongolia

In the summer of 2002 I was again contacted by Tony Whitten and asked if I might be available to participate in a Forest Sector Review of Mongolia, as a background document to a new World Bank/Government of Mongolia Country Assistance Strategy. I replied that I'd be very interested and asked when it might be. He said he hoped in the fall because he was sure I wouldn't want to be there in winter. He said that he would like me to act as Team Leader and Forest Management Specialist, and could I try to recruit both a Forest Product Processing and a Forest Policy/Economics Specialist. On recommendations from people in the Ministry of Forests, I was able to enlist Nick Crisp for the former and Mike Mullins for the latter. I informed Tony Whitten and he said negotiations with the Mongolians were progressing and he'd be back in touch with details and scheduling. I had almost given up when Tony phoned me in early December and asked if we would be prepared to mobilize in early January. I was stunned and reminded him that he had said we should absolutely avoid going to Mongolia in winter. He responded by saying, "Ah, you're Canadians. You shouldn't be bothered by a little cold weather". I conferred with Nick and Mike and we agreed to go, and then had a little competition to see who could get to stores first to purchase the few items of winter work clothing available in Victoria.

We left for Mongolia in the second week of January with an over-night stop in Seoul, which was bitterly cold and a hint of what was to come. We continued the next day to Ulaanbataar, landing on a bright sunny day at -39^0 C.

We were met at the airport by Ms. Radnaaragchaa Sarangoo ("just call me Radna"), the International Cooperation Officer for the Ministry of Nature and Environment. Radna arranged our transportation, accommodation, and all of our meetings with great efficiency over the next month, while also trying to arrange her own imminent departure for postgraduate studies in Australia. We were to stay in the Hotel Ulaanbataar, an impressively cavernous, and drafty structure from the Soviet era (subsequently somewhat upgraded to become the Kempinski Hotel Khan Palace - what's in a name?). We were introduced very early to Hans Hoffmann, of the German international aid agency, Gesellschaft fur Technische Zusammenarbeit or GTZ, and capitalized on his long experience in the Mongolian natural resource sector. We made several field trips to forest areas and wood processing facilities and met with 26 organizations and individuals in the course of the mission.

Ice sculptures for Tasgaan Sar.

Everyone told us not to worry about the cold – that everything would change after Tsagaan Sar (the annual Lunar New Year celebration in early-mid February), and they were right! In the course of a week it was sunny and a "balmy" -20^o C. Hans

Hoffman took us to a GTZ German hunting lodge in the forests north of Ulaanbataar for the Tsagaan Sar holiday where we feasted on German smoked meats, sausage and beer, and cross-country skied.

On returning to Ulaanbataar we pulled together an outline and a first draft of our report for review and initial comment before we left. Our report covered the following:

- Historical Trends in Forest Condition and Forest Use;
- The Institutional, Legal and Policy Context for Forest Management in Mongolia;
- The Industrial Forest Sector in Mongolia;
- Key Issues and Constraints to Forest Sector Reform and Restructuring;
- Recommendations: A Suggested Blueprint for Change;
- Recommended Areas of World Bank Assistance to the Forestry Sector.

We returned to Victoria in March, completed a final draft incorporating the excellent review comments received in Mongolia, and sent it to Tony Whitten for a final review by World Bank staff in Washington. We received very supportive and constructive comments from Tony, Bill Magrath and others in the Bank's Asian Department and completed a final version that was subsequently published by the World Bank as "The Mongolian Forestry Sector Review 2004".

2004: Consultant to The World Bank and the Government of Mongolia

I had talked to Tony Whitten about the work that I had done in Bhutan with Hatfield consultants on an environmental management framework and Tony felt the approach had real application to Mongolia. He arranged a consultancy to advise the Mongolian Ministry of Nature and Environment (MNE) on:

- improvements to its existing obsolete, environmental impact assessment process;
- a system of enforceable national environmental discharge and emission quality standards (air and water) and compliance monitoring procedures;
- ambient environment quality criteria (air and water) and procedures for ambient environment monitoring; and
- procedures for environmental compliance investigations and enforcement.

Also at MNE's request I prepared sectoral environmental management guidelines for the mining, leather, cement, wood products, wool and textile, meat and dairy products, and brewery and distillery production and processing sectors.

My MNE counterpart in this project was a very competent young woman named Narantuya D ("just call me Nara") who still sends me Christmas wishes to which I reply at Tsaagan Sar (Lunar New Year).

2005 to 2008: Consultant to The World Bank and the Government of Mongolia

The northern eighth of Mongolia consists of an extension of the Russian sub-boreal taiga spruce/fir forests grading into open pine/larch savannahs at the edge of the grassland steppe. The savannah forests, which were maintained historically by low-intensity ground fires, contain many species of importance to local human communities, and form a barrier to grassland fires encroaching into the sub-boreal taiga. With blanket fire suppression activities, they are increasingly threatened by dense encroachment of woody species from the taiga forests to the north and from invasive woody shrub species resulting from overgrazing of the grassland steppe to the south. There is an urgent need for manual fuel reduction, and the re-introduction of low-intensity prescribed fire to rehabilitate these larch/pine savannah forests and protect them from catastrophic wildfire.

My long-time colleague Bob Gray, a prominent B.C.-based fire ecologist, and I provided technical assistance to the Ministry of Nature and Environment in the conceptual design of a forest landscape rehabilitation and community forest management project proposed for World Bank funding. We organized and led a ten-person study tour for senior Mongolian Government officials of forest landscape restoration and forest fire management/fuel reduction projects in the dry, fire-maintained forests of S.E British Columbia, Western Montana, Idaho and Eastern Washington.

In Memorium: Mongolia was the last time I had the privilege of working with Tony Whitten on a project. On November 29, 2017 he was killed after being struck by a car while cycling home from work in Cambridge, U.K. – a tragic loss to environmental and natural resource management worldwide.

Guyana

2000. Consultant to the Environment and Development Group, Oxford, U.K.

I advised the Environmental Protection Agency and the Forestry Commission of the Government of Guyana on harmonization and integration of a recently developed national environmental and social impact assessment (ESIA) process, and the existing strategic and operational forest concession planning process. I reviewed and commented on the newly prepared Forest Concession Planning Manual and the Guyanese Forestry Codes-of-Best-Practice and recommended mechanisms to integrate these into the new ESIA process. As noted earlier forest concessions in Guyana were some of the best managed and monitored I've seen anywhere in the "Third World". The Forestry Commission staffers were a joy to work with - extremely knowledgeable and thoroughly professional.

Mining Companies

1998: Consultant to Moa Nickel S.A., Moa, Cuba

In association with Dillon Consultants Ltd. of Canada and CESIGMA Consulting of Cuba, prepared a short-term mine reclamation/environmental management program, and advised on policy and technical aspects of long-term reclamation, environmental planning and environmental remediation of severely contaminated sites and aquatic environments associated with large nickel/cobalt surface mines in Eastern Cuba.

2006: Consultant to Sherritt-Gordon Ltd. Canada

Hired by Sherritt-Gordon to provide advice on the potential environmental and social liabilities associated with its possible purchase of the existing Moa Nickel Mining project in

Cuba. Like many industrial operations in the communist world this operation had operated under virtually no environmental or social controls, and my recommendation was that Sherrit-Gordon would not want to assume the existing environmental and social liabilities of the operation.

An additional educational experience for me was an introduction to the sex trade workers, common to so many resource development areas worldwide. These incredibly beautiful young women represented the whole spectrum of Cuba's "rainbow culture" from ebony black through cafe-au-lait to cream. Once they realized you weren't a potential client, they became very friendly and talked over morning coffee about their hopes and plans after their current "profession". They were very positive about the regular monitoring of, and treatments for, STDs by the Cuban Health Ministry. This brought back to me the excellent Cuban doctors I've visited in many parts of Asia and Africa who were part of a major medical/foreign aid program to the developing world by the Cuban Government.

2008: Teck Cominco Ltd. Canada

I was hired, at old friend and colleague and Teck's Environmental Manager Roger Berdusco's recommendation, by Teck Cominco to assess the viability and potential environmental liabilities of Teck's acquisition of the proposed Petaquilla Copper/Gold/Silver Mining project in south-central Panama. The proposed project and facilities sit astride the Meso-American Biodiversity Corridor (described in Case Study # 6), and several project facilities would both cut directly across this internationally-funded environmental connectivity project, and seriously affect the livelihoods of indigenous peoples. Past exploration and development work carried out by the local Petaquilla operators had been very poorly planned and implemented, casting significant doubt on the Company's integrity and competence. Teck subsequently declined this investment opportunity.

World Bank "Desk Projects"

After my leg injury in 2009 in Laos I was increasingly asked by central strategic and economic research groups of the World Bank to assist in analyses for studies and programs proposed in areas where I had some experience and that required only modest fieldwork.

In 2009 I provided input to a "flagship" study by the Central Economic Unit of the Bank on the impacts of "commodity-dependence" on the countries of Central and South America and the Caribbean. Input included the generic environmental and social impacts of different commodity sectors (large-scale and artisanal mining, ranching, meat and leather products, coffee, crop agriculture) and recommendations on governance models that would be most relevant to the management of impacts in each of these "resource commodity" sectors. One problem expressed by the manager of this project was that they had no geographical reference for the distribution of commodity production. I prepared a broad-scale biophysical map of the region and related commodity occurrence and production to the various bio-physical map units. They seemed pleased with the result.

CASE STUDY # 5: UXBs and Agent Orange - American War Crimes in Laos, Cambodia and Vietnam

Starting preparation for the Laos project in the southern provinces of Champasak, Salavan, Savannakhet and Khammouane, one day I was in the World Bank office and began talking to a young Canadian mining engineer. He was managing a small gold/silver mine in the Annamite Mountains on the border between Salavan and Champasak. He asked, "How will your program deal with the unexploded bomb (UXB) situation?" and I said "What UXB situation?" He took me back to his office and pulled out several U.S. Military map sheets covering the area of their mining concessions in the two provinces. I was completely dumbstruck – there was not a square inch of the areas covered by those maps that hadn't been subject to "carpet bombing" from mountaintop to valley bottom. Bombing took place along the whole of Laos' 1200 km border with Vietnam, but the four southern-most provinces suffered most because they were directly on the flight path for US bombers from bases in Thailand and aircraft carriers in the Gulf of Thailand to Southern Vietnam. Obviously, under these realities we had to be very selective of the areas we chose for the project.

The following is an excerpt from the 2018 book: "The World As It Is: A Memoir of the Obama Whitehouse" by Ben Rhodes, Deputy National Security Advisor, who had been sent by President Obama to prepare a report on the Laos situation in 2016.

> "Laos is the most heavily bombed country in the history of the world. From 1964 to 1973 the U.S. dropped more than two million tones of ordinance on Laos to disrupt the Ho Chi Minh trail and try to staunch the communist insurgency in Vietnam – more than was dropped on all of Germany and Japan during WW2. There were 580,000 individual bombing missions, which averages out to one every eight minutes for nine years. Sometimes U.S. planes returning to Thailand and aircraft carriers in the Gulf of Thailand from missions over Vietnam indiscriminately dropped their remaining bombs on Laos rather than risk landing with live ordinance. More than 270 million cluster bombs -"bombies"–were used and an estimated 80 million of them failed to detonate. These bombies are bright and shiny, and very attractive to children. More than 50,000 people have been killed or injured in UXB accidents over the past decade (2008 – 2018), and nearly half of those casualties have been children. The UXB problem is not just a humanitarian issue, it's also a development issue because so much land is just too dangerous to use."

In subsequent projects, particularly in parts of Vietnam, we also had to deal with problems of unexploded ordinance, though never on the scale we encountered in Laos.

Even more insidious and reprehensible was the program, codenamed "Operation Ranch-Hand" to use herbicides to defoliate upland and mangrove forests to eliminate cover used by North Vietnamese and Viet Cong forces, particularly along the Ho Chi Minh trail in the Annamite Mountains. The herbicide of choice was "Agent Orange", a "rainbow herbicide" mixture of 2,4,5-T and 2,4-D but with significant concentrations of TCDD, the most toxic of dioxin compounds. Operation Ranch Hand sprayed over 20 million gallons of Agent Orange

over Vietnam, Cambodia and Laos from 1961 to 1971. The result has had devastating and long-lasting implications for both human health and the environment:

Human health:

- Significantly higher rates of infant mortality and birth malformations (500,000 documented cases).
- High rates of respiratory diseases, various cancers, skin diseases (chlor-acne), and severe psychological and neurological problems.
- Over 400,000 people killed as a direct result of exposure.
- Over 2 million cases of cancer of various kinds.

Environment:

- Significant impacts on both natural and agricultural communities.
- Serious long-term damage to coastal mangroves and evergreen rainforests (deciduous rain forests were less susceptible because they shed their leaves in response to the spraying).
- Toxins have been highly persistent in soils, lake and river sediments, and in food chains.

One of the more unfortunate and unintended consequences of this program was that its main victims were the Montagnards (mountain people), in particular the ethic Hmong, who had been loyal allies of first the French, and then the Americans against the Viet Cong for over 25 years. Five decades later the Kurds have learned a similar lesson in Syria and Iraq on what it is to have Donald Trump's America as an unreliable ally. To its credit the American Government at least took 260,000 Hmong people, largely soldiers and their families, back to the U.S. and settled them primarily in California, Minnesota, and Wisconsin (though winters in the latter two states may have seemed almost like a fate worse than death for these tropical peoples).

Hatfield Environmental Consultants of Vancouver has carried out many studies for U.N. Agencies and international NGOs on the residual Agent Orange and UXB problems and potential solutions in Indochina, and in the process has been "blacklisted" several times by the U.S. government. To date the U.S. Government has taken little or no responsibility for either of these travesties.

CASE STUDY #6: Natural Disturbance Regimes: A Context for Sustainable Natural Forest Management and Recovery

Ecosystem classification systems assist with management by allowing us to predict what plant and animal species might occur on different landscapes. However, we need to understand more about the dynamics of these ecosystems if we are to manage them effectively. The concept of natural disturbance regimes (NDRs) adds another level to our understanding.

Disturbances vary from large-scale disruptive events (such as wildfire, major insect infestations, and un-natural, human-caused deforestation), through medium-scale disturbances (such as extreme weather events, floods, landslides, and localized insect infestations), to small-scale events (such as the death of a single tree or small group of trees due to disease and/or old age). Far from being a negative influence, natural disturbance regimes renew ecosystems and diversify landscapes at levels that are historically consistent. Disturbance only becomes of ecological concern when in departs from the NDR.

The NDR largely determines species composition, vertical canopy architecture and spatial structure over time. In natural ecosystem management, activities (especially harvesting) must "mimic" NDRs in intensity, frequency and spatial scale. Management systems that differ too widely from the NDR will change or even convert natural ecosystems, which may be acceptable but only if all the consequences are fully understood and accepted.

For simplicity, three distinct forest NDRs will be described here, but in reality these three types are but points on a continuum of ecological communities (from wet to dry) and there is often an almost infinite gradation between them. Some classification systems designate NDRs by the type of ecosystem that results, while others describe the type and frequency of disturbance. Both systems are included here.

<u>Gap-driven forest ecosystems</u> (also described as stands resulting from rare, small-scale stand modifying events):

- Multi-aged, multi-storied stands of high species diversity in wet climates.
- Structure is maintained by the death of individual trees or small groups of trees, and by very infrequent more extensive disturbances over 300 to 600 year return periods in drier climates and 600 to >1000 year return periods in wetter climates.
- Light penetration to the forest floor depends on the size and number of gaps, but is generally higher than in even-aged disturbance-driven forests, resulting in a relatively richer understory flora.
- Stands contain considerable dead organic matter in the form of a thick soil humus layer, downed coarse woody debris and standing snags.
- Very infrequent low intensity wildfires generally burn incompletely and discontinuously leaving behind unburned areas and significant living stand components in burned areas, creating both vertical and spatial diversity.
- Regeneration occurs in small gaps created by the death of individual trees or small groups of trees.
- Wildlife and floral species have evolved in the absence of major disturbance.
- High species richness (especially birds and insects) is due to the multi-storied nature of these forests.
- Edge effect due to un-natural disturbance is invariably detrimental, leading to increased predation, species displacement, invasion by "pioneer" species, and fire-proneness.

- Have proved most difficult to manage by conventional industrial forestry practice because of high species diversity and variable log sizes (industry prefers a homogenous product).
- Any major reduction in canopy complexity (particularly clear-felling) will result in significant biodiversity losses; thus these communities are most appropriately managed by single-tree or small-group selection harvesting systems.

Ecological Importance: Gap-driven forests are amongst the most biologically diverse terrestrial ecosystems and contribute significantly to the welfare of indigenous human communities around the world. The very large living and dead biomass and the stability of these forests under natural conditions over hundreds of years makes them the closest to long-term carbon sinks as any terrestrial biological communities, except perhaps peat swamps. Clear-felling and burning of tropical gap-driven forests in South America and Southeast Asia and conversion of wetland peat forest communities have contributed significantly to global carbon dioxide and methane emissions and have had serious impacts on regional air quality.

Disturbance-driven forest ecosystems (also described as stands resulting from frequent stand-initiating events):

- Generally even-aged forest communities in moist to semi-dry climates that are characterized by relatively frequent (70 to 150 year return periods) catastrophic disturbances (usually fire).
- Relatively resilient ecosystems where maximum biodiversity occurs at the "ecotone" between early seral and more mature forest communities.
- Wildfire is a major influence, with insects (defoliators and bark beetles) and root disease secondary initiators in older stands. Fires are generally caused by lightning strikes or by accident.
- Biodiversity is associated with the early pioneer stages of ecological succession and with mature forest remnants.
- Many species have fruits and seeds that require heat for release, dispersal and/or germination.
- Fully stocked, regenerating stands (whether natural or resulting from planting) are characterized by relatively low biodiversity from juvenile age to maturity.
- Wildfires have frequently resulted in significant property damage and losses, and fire emissions have had serious impacts on regional air quality and atmospheric carbon emissions.

Ecological Importance: Disturbance-driven forests have relatively low biologically diversity, and often form dense stands of a single species (usually pines in the northern hemisphere) over large areas. Tree species are relatively short-lived, losing vigor and becoming susceptible to insect attack and/or disease at about the same age as the disturbance return cycle (80 to 100 years), after which they are susceptible to insect attack and/or wildfire. Clear felling can mimic the historic effect of wildfire and, if done strategically, can contain and limit fire spread across the landscape. The national "Fire Smart" program provides advice

and assistance to local communities in strategic fire prevention and control in these ecosystems.

Disturbance maintained ecosystems (also described as ecosystems resulting from frequent stand-maintaining events):

- Open, multi-aged savannah-like forests interspersed with grassy and shrubby openings.
- Frequent, often anthropogenic, low intensity fires (<10 year return period) moderate woody fuel accumulations, and rejuvenate herb and shrub layers.
- Fire maintains species composition, stand structure, and regulates fuel loading.
- Timing of fires is critical: too frequent seriously affects tree regeneration; too infrequent increases understory growth and fuel loadings, which may ultimately increase fire severity.
- Generally comparatively low in biodiversity, though often high in endemism. Large ungulates and associated predators, upland ground birds and raptors, and burrowing species are usually a significant component of biodiversity.
- Diversity is closely related to stream courses, springs and moist depressions.
- Indigenous peoples' food use of these ecosystems focused on herbaceous species that store nutrients in underground structures (bulbs, taproots, corms, etc) and on shrubs that fruit most prolifically on new growth.

Ecological Importance: Disturbance-maintained ecosystems, because fires are typically cool and incomplete, are carbon stores in both above ground fire-resistant vegetation and in ash and charcoal in the soil. Stored soil carbon has been used to chart fire history on many of these ecosystems worldwide. Regular low-intensity prescribed fire is a requirement on these ecosystems in order to avoid excessive fuel accumulations and high-intensity fires that will result in significant carbon emissions, ecosystem degradation and damage to human property.

Case Study # 7: The Tragedy of Gap-driven Forests.

As alluded to above, gap-driven forest communities world-wide have presented conventional industrial forest management with its greatest challenge – a challenge that forest managers have generally failed to meet. Present forest industries are geared for volume fibre production, and to generate a fairly narrow range of homogeneous, standardized products. Gap-driven forests are too diverse – in species and in log sizes – to fit this large-scale, homogenized industry model. The common response of conventional industrial forest management has been to convert these wonderfully diverse forest ecosystems by clear-felling to simple agricultural and wood fiber monocultures.

In temperate North America the main gap-driven forests are (or were) the deciduous Carolinian forests of the eastern seaboard, the second most diverse temperate hardwood forests in the world, and the wet maritime coniferous forests of the Pacific Coast. Only small, degraded remnants of the Carolinian Zone remain; most of it had been logged and/or

converted to agriculture by the mid-1800s. In the Pacific Northwest the two best illustrations of what we've done to our maritime rainforests can be seen driving:

- from Clallam Bay to Hoh on the Olympic Peninsula, contrasting the miles of Weyerhaeuser tree farms resulting from clear-cutting to the west with the old growth forests of Olympic National Park to the east; and
- through the thousands of hectares of industrially logged, slash-burned, clear-cuts from Cowichan Lake to the edge of Carmanah/Walbran Provincial Park.

In tropical America, after several years of maintaining that de-forestation was under control, the Brazilian Government has now grudgingly acknowledged that it's losing as much (or more) tropical rainforest in the Amazon Basin as ever; now to maize for gasohol, soy beans, beef for "MacBurgers", and uncontrolled alluvial gold mining using arsenic for gold recovery. Not that President Bolsonaro (the Donald Trump of South America) seems particularly concerned, and anyway, by some bizarre twist of logic, he says that it's all Leonardo de Caprio's fault.

The World Bank is involved in a multi-million dollar project with all of the Central American countries to preserve, as a last-ditch measure, the "Meso-American Biodiversity Corridor" providing genetic connectivity between southern Mexico and northern Columbia. The project will utilize the gap-driven rainforests on the Caribbean Coast for connectivity, but the development pressures are huge and government management capacity is very limited. The most amazing part of this story is that genetic studies on Jaguars and their major prey capybaras, show no genetic disconnects along the whole Corridor, which means that thus far the corridor is functioning. Even the Panama Canal doesn't seem to have been a barrier as jaguar and capybaras are regularly seen swimming between the oil tankers, luxury liners, and container ships.

The three bright spots in Tropical America are Costa Rica, the Dominican Republic and Guyana (the latter has the best controlled and managed industrial forest concessions I've seen anywhere in the world - except Laos of course – see above).

From my travels in Australasia: Australia is managing its tropical (Queensland) and sub-tropical (New South Wales and South Australia) closed forests in a fairly credible way; but is doing as poor a job as we are by clear-cutting in its temperate rainforests (Tasmania). In New Zealand the sub-tropical North Island is an ecological "basket-case" with only small remnants of its original, diverse and endemic, mixed coniferous/broadleaf rainforests remaining. On the South Island there are only small remnants of the original mixed temperate forests left on the east coast. Huge areas on both islands have been converted to agriculture (of course) but also to wood plantations of exotic conifers (mainly American pines). Only the west coast of the South Island retains some natural forest, in its wonderful old-growth southern hemisphere beech (Nothofagus spp.) forests (which "starred" in the Lord of the Rings movie). In the late 1980's, after a Royal Commission investigation of the New Zealand forestry sector, the

government disbanded its Forestry Service, sold off the exotic pine timber plantations (over a third of which were deemed uneconomic), and placed all remaining natural forests under the authority of the environmental protection agency – nowhere in the world has there been a bigger "slap-in-the-face" to a national forestry profession.

South and Southeast Asia have been my major areas of professional focus from 1995 to 2014, and the natural forest management record is one of almost unrelenting gloom (I hope there's no correlation here but some of it is historic and before even my time).

As I've mentioned elsewhere, China had the most diverse and extensive temperate and sub-tropical, gap-driven forests in the world. The Chinese temperate hardwood forests had 12 genera that didn't exist in the American Carolinian forests, and the latter had only 3 genera that didn't exist in Chinese forests. Sadly, almost all of these forests are now gone. The last of them were burned in the mid 1950s to 1970s in village iron smelters during Mao Zhedong's "Great Leap Sideways" (1958-1969) and the Cultural Revolution (1966-1976). Every village was required to produce pig iron that was of such poor quality that no one wanted it, and those villages that didn't have coal used hardwood for smelting. China's only native broad leafed ecosystems now exist in isolated patches in mountain areas. China has also converted most of its remaining (albeit degraded) lowland natural ecosystems into millions of hectares of badly managed (and therefore pretty useless except as a one-off bio-energy source) wood plantation monocultures of largely exotic species.

The remaining intact blocks of broadleaf temperate East Asian rainforests (oak, beech, chestnut, walnut, and many species of the Laurel and Tea families) now exist only in the lower mountains in small parts of Nepal, extensively in Bhutan, northeastern India and Yunnan/Szechwan in China.

The situation in tropical Southeast Asia is equally as bad. In four countries of the region (Vietnam, Thailand, Peninsular Malaysia and the Philippines) natural forests had all but been destroyed by the 1970s and 1980s. Vietnam because of 30 years of uninterrupted warfare and extensive spraying of "Agent Orange" - see editorial comment #9 - and the other three because of almost half a century of totally unsustainable and uncontrolled commercial forest conversion/exploitation.

Harvesting of natural forest remnants in most of these countries has now been, belatedly, banned. Burma's monsoon teak forests had been under sustainable selection harvest management for 150 years since British Colonial times, until Thailand ran out of wood and the venal Burmese Military Junta became starved for foreign funds. For the last 30 years, Burmese forests have been "bleeding" teak in military trucks to the Thai border.

Indonesia had over 70% forest cover in the late 1980s. The result of twenty-five years of anarchy, government incompetence and widespread, systemic corruption, particularly by the Ministry of Forests, is that most of the wonderful lowland rainforests, amongst the richest and

most diverse on earth, are now gone from Sulawesi and Sumatra, and are estimated to be gone from Kalimantan (along with most orangutans and gibbons) if nothing changes by 2025. In the process of converting these forests to commercial crops there have been significant regional air quality impacts and greenhouse gas emissions.

Cambodia had 65% forest cover in 1947. It opted in the early-1990s to manage its forest estate through industrial forest concessions, but by 2002 an international audit (referenced elsewhere in this document) concluded that forest management was compromised by "greed, corruption, incompetence and illegal acts that were so widespread and pervasive as to defy the assignment of primary blame." The Government gave industrial forest operations an ultimatum to improve management, which was ignored, and since 2006 all but 6 of 23 concessions have been cancelled and there has been a moratorium on further forest harvesting (with much support and pressure from the World Bank, Asia Development Bank, and International NGOs). The result of all this, however, has been a "land tenure vacuum" that has encouraged other, even more corrupt, government agencies to engage in a land concession "gold rush". The Ministry of Mines and Industry, for example, has issued 15 mineral licenses (reputedly with much money passing "under the table") covering 75% of Cambodia's "flagship" protected area - Ratanakiri National Park.

Serious governmental and industrial dysfunction in the region is leading to accelerated deforestation which threatens the welfare of millions of rural, forest-dwelling, ethnic minority peoples who have been marginalized by political processes dominated by ethnic and/or urban elites. Many of these forest-dwelling peoples rely on the forest directly for a wide array of services: to replenish the nutrients on land farmed under rotational (swidden) agriculture; for plants as foods and medicines; for livestock fodder; for fuel; for building, tool and artisanal materials; for traditional handicrafts; and for sustainable income-generating activities (e.g. rattan collection and damar resin tapping). Many of these communities also rely on the forests for a higher proportion of their annual protein intake (50 to 60%) - from birds, small mammals, and even insects, than in any other part of the world.

Initially, deforestation was driven by the demand for fine tropical hardwoods. Much of the regional problems in this regard can be laid at China's door. China is so desperate for quality wood resources that it doesn't really care whether they're legal, illegal, sustainable or unsustainable; and corrupt Chinese companies continue to be a real impediment to regional initiatives to deal with illegal activities and to implement forest certification programs.

More recently, deforestation has been driven by renewed interest in palm oil as a food, cosmetic, and biofuel resource, by renewed demand for natural rubber, and by Indonesia's need for plantation-produced wood fibre to supply its huge investment in pulp and paper processing. So far the picture I've painted for gap-driven forests is one of unrelenting gloom. However, for a really good-news story, and one that sets an example for the rest of the region, see the previous discussion of the Laos forestry project.

CHAPTER 18: VOLUNTEER WORK AND TEACHING AT UVIC: 1984-2016

In 1989 I began volunteer work with the Garry Oak Ecosystem Recovery Team (GOERT), a Federal/Provincial/Local Government-sponsored program focused on the protection and recovery of Vancouver Island's Garry oak savannah woodlands, one of Canada's most endangered ecosystems. Garry oak communities occur from Southern Vancouver Island in Canada, through Puget Sound in Washington and the Willamette Valley in Oregon, to Northern California. These communities were managed for thousands of years by First Nation's peoples with prescribed fire and cultivation for a variety of root and bulb crops (primarily Camas and Desert parsley) and berries – based on the characteristics of savannah plants that herbaceous species store nutrients in underground organs, and shrubs fruit most prolifically on new wood.

Since European contact, fire has been largely excluded from these dry savannah ecosystems, resulting in significant encroachment by woody shrubs and non-native invasive weeds. In over a decade of work with GOERT, I chaired or co-chaired its Native Plant Propagation and the Fire and Stand Dynamics Steering Committees. The main intent here was to promote the use of Garry oak plants, invasive plant removals, and prescribed fire in the rehabilitation and maintenance of these oak woodlands. I have also worked as a volunteer with the Friends Of Uplands Park in Oak Bay, attempting (without much success to date) to re-introduce small-scale, low-intensity controlled burning to rehabilitate this iconic Garry oak savannah protected area. Fire would have two main functions in the park - first, to restore its open, savannah-like character and associated species, and second, to reduce fuel loadings and thus the risk of uncontrolled wild fire to adjacent residential areas

I was regularly a sessional lecturer the University of Victoria from 1984 to 2008, developing and teaching the following:

- In the Faculty of Environmental Studies: two courses: Environmental Impact Assessment; and Conservation Biology.
- In the Department of Continuing Studies, Restoration of Natural Systems (RNS) Program, three courses: Mined Land Reclamation; An Ecosystem Approach to the Management of Non-timber Forest Products; and the Selection, and Propagation of Native Plants for Ecosystem Restoration (with colleague Brenda Costanzo).

For the latter two courses in RNS I had the opportunity to work with the technical services staff in Continuing Studies to deliver the courses on-line. This was a huge advantage to me at the time because the "Course Requirements and Lecture Notes" were delivered on-line to the students, I could access exams and assignments to mark, and communicate with students on chat sites from anywhere in the world with web access – even Mongolia! There was something almost surreal about sitting in my hotel room in Ulaan Baatar chatting by text on-line in real time with students (or maybe it just shows how "technologically-gapped" I'd become).

In 2002 I was approached by Dr. Gordon Hartmann, an old Ministry of Environment colleague, who explained that he and Dr. Tom Northcote of UBC and Westwater Research Institute were co-editing a book on "Fishes and Forestry: Worldwide Interactions and Management". He asked if I would consider writing a chapter on Southeast Asia. I said I'd be happy to do the forestry and hydrology part but I couldn't do the fisheries bit. He said not to worry, as they had an Australian fisheries biologist from the University of Tasmania, Keith Martin-Smith who would be happy to co-author. Drs. Hartman and Northcote were even more pleased in the end when Keith and I contributed two chapters to the book, the first on fish-forestry interactions in Southeast Asia as a whole and the second focusing on two regional case studies - upland streams in Borneo, and Cambodia's Tonle Sap (or Great Lake) in Sumatera.

CHAPTER 19. The Twilight Years: 2020 and Beyond

We're now two and a half years into the new decade!! How do you like it so far?? Pretty unsettling eh? The incompetent and poisonous Donald Trump and his GOP mini-me's, a global pandemic, an unprecedentedly toxic and divisive U.S. election, a microscope placed on systemic racism and social inequalities, serious rioting in many U.S. cities and abroad, catastrophic forest fires and floods across the globe, and more!

For me the last two years have been a bit of a roller coaster with some pretty serious health problems - two brain (subdural) hematomas and subsequent bacterial and fungal (meningitis) infections). To help break the boredom of recuperation I finished this memoir and wrote two final "topical" Case Studies, starting with (surprise) one on COVID-19 (Case Study #8). I began by doing a little primer on viruses and epidemics for the children of the family and to gross out daughter Rachel but, as you'll see, I got a bit carried way. I may have a bit more experience in this field than the average person just because I've spent so much time in the tropics and have had the advantage of really good regular briefing notes on disease risks from my employers, particularly the World Bank.

My last Case Study (#9) is on re-resetting personal expectations and international/ national development strategies in re-building a post-COVID-19 world. The last major world-wide social and economic upheaval dates from the Great Depression of the 1930's and the Second World War. Under the leadership of the United States, and utilizing newly-created United Nations Organizations and the International Bank of Reconstruction and Development (a.k.a. The World Bank), the international community began to rebuild the post-war world and its economies. It is now becoming evident that many of the directions and programs embarked upon have had serious, unanticipated social and environmental consequences or are simply no longer relevant in a changing world. The inspiration here comes from some very pertinent graffiti seen recently on a Hong Kong subway that read "There can be no return to normal because normal was the problem in the first place". In short we don't just need to build back, **we need to build back better**. I'll end with this piece since it brings together much of my life experience and philosophies relating to sustainable development and natural resource management.

CASE STUDY #8: COVID-19: The Anatomy of a Pandemic

Major disease outbreaks occur in two forms of geographic extent and severity – epidemics and pandemics that are defined as follows:

- Epidemics are disease outbreaks that occur in a particular region and generally affect only certain vulnerable members of the community (usually the elderly and those with compromised immune systems).
- Pandemics are disease outbreaks that occur aggressively over wide geographic areas and affect a high proportion of the population, usually with significant mortality.

The most serious pandemic in modern times occurred in 1918 at the end of World War 1. To set the stage, after five years of vicious conflict, Europe was in ruin. Widespread food shortages had resulted in serious malnutrition and the destruction of public infrastructure, particularly potable water distribution and human waste collection systems. Housing was destroyed and several cold winters had resulted in severe respiratory diseases.

The epidemic began in January 1918 (for reasons never explained named "Spanish flu"), and occurred primarily in two phases, though some sources refer to a third. (**Right-wing Nuts take note)**. The first phase passed fairly quickly and primarily killed the sick the elderly and those with compromised immunity. It then retreated, apparently mutated into a far deadlier form, and returned with a vengeance. In mid 1918 the European politicians took the cynical and hasty decision to demobilize the armies and immediately return non-European troops to their home countries: British Empire – Canada, New Zealand, Australia, India, South Africa, Caribbean; the rather small American war contingent; French Empire – Middle East and Indochina; Italian Empire – North Africa; Dutch Empire– Indonesia; Russian Empire – Eastern Europe, Central Asia and Mongolia, and I seem to have read somewhere, an apparently significant number of Chinese laborers who were brought to Europe (often from work on the North American railways) to dig trenches and build fortification - AND THE DISEASE WENT GLOBAL!

From January 1918 onwards over the course of the pandemic the disease infected an estimated 500 million people (1/4 of the world's population at the time) and killed up to 50 million - **the vast majority of these from the second surge.** The following ten decades have seen a series of pandemics of various severity and geographical extent, a selected few of which are summarized with their characteristics in the following table.

Table 1. A historical overview of some major pandemics over the past 100+ years

Disease/Occurrence	Symptoms	Vectors	Reservoirs
Spanish flu[1]	Acute respiratory distress, death.	Contact with pigs and infected humans through respiratory fluids.	Domestic and wild pigs (originally from birds?), infected

			humans.
Dengue[2]	Ranges from mild flu-like symptoms to headaches, severe pain, fatigue, internal bleeding, organ failure.	Mosquitos	Infected humans and animals.
SAR S[1] (another variety of Corona virus).	Acute respiratory affliction, fever, cough, death.	Exposure to infected humans and close contact with reservoir species	Infected humans, Origins suspected in bats, civet cats, roof rats
Ebola/Hemorrhagic Fevers[3]	High fever, body pain, headache, unexplained bleeding/bruising, death.	Physical contact with infected humans, animals, and contaminated blood, and consumption of undercooked wild meat.	Suspected fruit bats wild monkeys other small mammals and infected humans.
Cholera[2]	Severe watery diarrhea, dehydration, and death.	Consumption of faeces-contaminated vegetables, water, fish and shell fish.	Same as vectors.
Zika[2]	Mild to high fever. Serious impacts in persons compromised by other diseases	Aedes mosquitos and sexual contact	Primates (wild monkeys), infected humans.
Tularemia[4]	Skin ulcer at bite site, severe headaches, fever, chills, long-term acute fatigue.	Ticks, deerflies, handling dead animals, breathing contaminated soil.	Ungulates, rabbits, rodents

* Distribution: 1. World-wide, 2. Pan-Tropical, 3. Africa 4. Northern Hemisphere

To explain Table 1, let's stop being human-focused, get "down and dirty", talk about things from the virus's point of view, and gross Rachel out by discussing disgusting bodily emissions and fluids. I've tried to make the following "child friendly" and educational for the benefit of our grand children and nieces. First, a definition: A virus is sub-microscopic (Really Small!!) infectious agent that reproduces itself only inside the living cells of another organism. They are found in almost every ecosystem on earth and are the most numerous type of living creature. They can infect all other forms of life including animals, plants, and other

micro-organisms such as bacteria. They have rates of mutations **many** times higher that any other life form, which means that they can evolve into different forms and adapt to new opportunities extremely quickly.

Once the virus has replicated itself inside the cells of its host it has to get those "babies" out into the wider world to spread its influence. The virus that spreads most effectively produces more new "babies" and ends up winning the evolutionary competition. Viruses have evolved very complex and often sneaky ways to spread from one individual host to another and from one species to another. These range through the following from less to more efficient:

- Simply waiting passively to be transferred to the next victim either by physical contact, exchange of body substances, or potential host consumption of infected body parts.
- Some microbes don't wait around, but take an active role in dispersal by hitchhiking, for example in the mouthparts of an insect that bites an infected host and then flies of to bite a new host. Most biting/sucking insects inject an anti-coagulant to keep the blood flowing and in some cases it is this that helps transfer the disease.
- Other germs take matters into their own hands by managing transmission through modifying the physiology and/or behavior of their host to enhance spread. These most often rely on what we normally consider disease symptoms and include coughs, sneezes, vomiting, diarrhea, urination, and weeping skin sores to pass on a variety of body fluids loaded with viral spores. For sheer nastiness in this category nothing beats the rabies virus that utilizes the saliva of a range of wild and domestic carnivores and bats for transmission. The disease stimulates extremely aggressive behavior in the affected animal and the disease is spread in saliva through bites.

Given these complex infection mechanisms and pathways, managing and preventing disease outbreaks is obviously a very difficult challenge.

It should be pointed out here that it's not in the virus's best interest to kill you. That's as much as an unfortunate unintended consequence for it as it is for you because having gone to all the trouble to infect you, when you die so does it. The most successful infectious diseases are those that make you chronically ill enough to pump out its babies until either you die of other causes or it is overwhelmed by your immune system. I'm sure this knowledge will be of great comfort to you.

What are some of the pre-requisites to the "successful" development of a pandemic?

1. A relatively warm and moist climate to support virus establishment and evolution.
2. Localized sites of high biological activity to allow virus multiplication and evolution.
3. Suitable vector and reservoir species or agents.
4. Underlying human health issues that depress the human immune system.
5. Mechanisms for broad-scale (regional, national and inter-national) dispersion of the virus.

The Chinese Government has suggested Wuhan City in Hubei Province, located at the western edge of China's coastal plain, as the possible source of COVID-19. While this is not yet certain, the city does meet most of these pre-requisites, which may be why it was raised as a possibility. In 1999-2001 I participated in a World Bank forestry project in China, and though Hubei was not one of our project provinces I passed through it a couple of times en-route to Sichuan, which was one of my primary responsibilities. So let's look at Wuhan in the context of these "pre-requisites".

1. Climate: The climate is classified as sub-tropical moist temperate. Daily maximum temperatures exceed 20^0 from April to October, there is precipitation in every month, and relative humidity exceeds 75% year round. Summers are described as hot/muggy/rainy – think of a really big incubator.

2. Biological Activity: Hubei has significant indigenous (non-Han Chinese) ethnicity, primarily Miao and Tuja peoples, which it shares with Sichuan. These peoples have a long tradition of harvesting and eating "bush meat " many species of which are disease vector and reservoir species. These are slaughtered and processed in "Wet Markets" which are hideously unsanitary. I did visit one market (one was enough) and saw standing pools of water that looked like "primordial ooze" – the whole market was just a big petri dish. I don't think there's any suggestion that wet markets play a role COVID-19 viral multiplication, they just provide a convenient and concentrated source of spores from human respiratory emissions (phlegm, snot and post-nasal drip) which are passed on by physical contact (transfer of spores by hand to respiratory and eye membranes and by breathing).

3. Vector and reservoir species: Humans. Though there is some speculation that the COVID-19 virus may have emerged from an animal source (bats?), there is not enough information to identify that source or to explain the routes of that original transmission. So for now COVID-19 is not considered "zoonic", or capable of interspecies transfer, and it remains for now solely a human disease.

4. Underlying health issues: e.g. serious air quality issues. Hubei lies at the edge of the Sichuan Basin, which is composed of massive uplifted limestone. It has become a major centre of Chinese cement production. Unfortunately there are very few environmental controls on production. The kilns use very poor quality coals with no smoke or fly-ash abatement. At the time I visited there were serious region-wide air quality impacts that included Hubei – some of the worst air quality I have seen anywhere in the world, except on par with parts of India. Respiratory illnesses were said to be very common which would certainly compound the impacts of COVID-19 unless there have been major air quality improvements over the past 20 years (which I doubt).

5. Mechanisms for Broad-scale Virus Dispersion: Varied, troublesome and efficient. David Miliband, ex Btitish Labour Party Foreign Secretary and Environmental Secretary described COVID19 as "a disease of a new connected world" and that has huge implications for disease transmission.

Hubei is the most populous city in central China with a population of 11 million. It is the political, financial and commercial hub of Central China, but more important it is the major transportation hub. It sits astride all of the major N-S highway corridors of the eastern seaboard, is located at the junction of the Yangtse River and its tributary the Han River which is navigable from major ports on the Coast, and it has the biggest and busiest international airport in central China. Hubei is reflective of what's happened globally – an exponential growth in human mobility and the potential spread of disease.

I first experienced this on a much smaller scale when I did a short-term project in Zambia in 1985 during the African AIDs epidemic. The primary disease reservoir was village prostitutes and the main dispersion mechanism was long-distance truck drivers. Over the ensuing decades we've increased our capacity to transport humans and transmit diseases by huge orders of magnitude. What used to be primarily ground-based transmission only 50 years ago now includes trains, planes, automobiles, and cruise ships. "Adventure" tourism travel has steadily moved into areas of the world where there are increased risks of being exposed to serious diseases, and people travel in crowded conditions that enhance disease transmission.

Clearly we have lost control of the situation. "The genie is out of the bottle" and COVID-19 has come along to remind us of the consequences. Our big challenge now is to decide how, under what conditions, and to what extent do we have to rebottle the genie and replace the cork.

You may be asking yourselves how all this relates to the other, primarily environmental, themes in this memoir. Good question, so let me segue into that. As I was developing Table 1, I was struck by recognition that so many of the species co-opted by viruses to store and transmit disease, particularly in the tropics and sub-tropics, are species of ecosystem disturbance and degradation. They are aggressive pioneer species that rapidly invade new habitats forming simple and unstable ecological communities. They are generally tolerant of humans and exploit human agriculture and infrastructure for food and shelter. Coincidentally, an article appeared in an issue of the Manchester Guardian in which Dr. Kate Jones, Chair of Ecology and Biodiversity at the University College, London called emerging animal-borne diseases "an increasing and very significant threat to global health, security and economies". In 2008 she and her colleagues identified 335 diseases that had appeared between 1960 and 2004, at least 60% of which came to humans from animals. She went on to say that these diseases "are increasingly linked to environmental change and human behavior. The disruption and degradation of functioning natural forests is bringing poor people into closer contact with species they have never been near before. Resulting disease transmission is now a hidden cost of misguided human economic development". Demands from the global north and from China leads to ecological disruption that drives human mobility and vulnerability to diseases.

Dr. Brian Bird, a virologist at the University of California Davis has pointed out that "diseases are likely to travel faster and further than before which means we must be faster in

our responses. This in turn needs investment and change in human behavior. We must make people aware that things are fundamentally different now". It also means that we will need reliable information and data to inform our responses, which in turn means greatly expanded virus testing and integrated broad-scale disease monitoring - and this is where we're currently failing. There have been many criticisms of the World Health Organization (WHO), most of which I think are misguided and unfair. Much of this I think stems from Donald Trump's ignorant and uninformed rants to cover up his own bungled and belated response to the crisis two years ago (remember it was a Democratic Party hoax?).

So let's provide some perspective here. When the world community set up many of the international multi-lateral agencies (like WHO) after WW2 they set lofty goals for cooperation, coordination and communication but then balked at giving them the tools to effective carry out those mandates. In the current context of assessing trends in public health and incidents of disease, WHO has absolutely no authority to collect independent data, or even influence how national data is collected and analyzed - it must simply accept what its given by the member governments. Maybe the current crisis will change this and build a more effective WHO - we can only hope because it's obvious that we need credible international oversight and coordination if we're to respond effectively to future health crises - and those will come!!

I have been quite impressed with Canada's response to COVID-19. The briefings by provincial and federal Public Health Officers have been excellent, particularly Dr. Bonny Henry in B.C. – informative and patient even with really dumb questions. BUT we have to stay the course – slowly and patiently with no shortcuts. Sweden is a great lesson. It was initially seen as the European leader in COVID-19 response and seemed to be succeeding, but early after relaxing some of the restrictions it saw a pretty dramatic spike in infections and deaths. Soon after the early relaxation, Sweden's deaths per 100,000 population was 17.3, compared with Norway's 3.37 and Finland's 2.56.

A little over two years into this pandemic, as the World Health Organization is mulling the tricky question of when, and under what conditions, to declare it "over", several countries have been tempted to pre-empt that decision, with potentially serious consequences. Over the forseeable future we will still need to test, vaccinate, and combat misinformation. We have to recognize that "endemic" does not mean harmless. It means that we accept continued circulation of a disease because complete eradication may not be possible. We will probably still have to encourage people to continue to wear masks in crowded and indoor settings.

We really need to improve our responses to this and future pandemics, which will require improved and timely identification and surveillance of pathogens, and the development and effective and equitable distribution of vaccines. It is also vital that the "intellectual property (IP)" of vaccines stays within the public domain. The WHO is promoting both the global sharing of knowledge and the building of public vaccine manufacturing capacity as vital to achieving vaccine equity and pandemic control. We also have to counter the worrying "right-wing conservative" contention that "vaccines are killing people", when, in fact, they have **demonstrably** saved thousands of lives in the U.S. alone. To date in the U.S. 81.9 million

people have been infected with COVID, and as of Mid-May 2022 over a million have died, - the overwhelming majority of both were unvaccinated.

CASE STUDY#9: Resetting the clock on personal expectations and national and international development strategies in a Post-COVID-19 World

December 2020

Introduction

In 1971 the influential British publication The Ecologist published a special edition entitled a "Blueprint for Survival" in response to what it saw as an emerging environmental, social and economic crisis. It concluded:

> "Radical change is both necessary and inevitable because present increases in human numbers and per capita resource consumption, by disrupting ecosystems and depleting resources, are undermining the very foundations of survival."

The authors recognized that because many of these issues had just begun to be discussed, let alone addressed, real transformation would take time. They continued,

> "We are sufficiently aware of political 'reality' to appreciate that many of the proposals we make will be considered impractical. However, we believe that if a strategy for survival is to have any chance of success, solutions must be formulated by what will be necessary and not from a timorous and superficial assumption of what may or not be immediately feasible."

"Blueprint for Survival" generated significant world-wide discussion and influenced the creation of a number of international environmental and socio-economic NGOs. The reaction from world governments, however, was much more muted and less positive.

The next major stimulus for change was in March 1987 when the United Nations' World Commission on Environment and Development tabled a report on its five years of studies and hearings. The report, entitled "Our Common Future'" advanced the notion of a 'Global Commons' and issued a strong challenge to all countries, but in particular the western market economies, to embrace the concept of sustainability in their economic and social development strategies. The Commission's report contained far-reaching recommendations on social development, food security, environmental conservation, energy efficiency, industrial development, and the challenge of increasing urbanization. It recommended that all nations adopt new policies and practices to integrate environmental conservation and management with economic development. Finally it advanced a number of important principles:

- The fundamental needs of people, both present and future generations, must be met, including food, shelter, clothing, education, employment, community stability, equity, justice and basic human dignity.
- Economic prosperity, environmental health and social stability are interdependent and interrelated at the local, national and global levels.
- The quality, integrity and diversity of natural and human environments must be maintained or rehabilitated into the future.

- Renewable and non-renewable resources must be conserved and prudently used so as to maintain a full range of opportunities for future generations.
- Optimal decisions on resource use must include considerations of economic efficiency, equitable resource allocation, cultural values, and ethical values such as the preservation of ecological and genetic diversity.

In short, sustainable development was seen as a goal or an ideal, characterized by prudence and vision, in which economic, social, and environmental objectives are balanced to build a society of lasting prosperity, stability and quality. Implementing sustainable development was seen likely to take place in three broad phases: first, the remodeling of existing institutional and management mechanisms to improve delivery; second, the development of innovative techniques to take advantage of new opportunities; and finally, a fundamental re-evaluation and re-definition of peoples' basic beliefs as they relate to the terms wealth, development and progress – termed the "Paradigm Shift". The international community thanked the Commission for its report and hard work, and then pretty well went back to business-as-usual.

Thirty years later COVID-19 has appeared with a vengeance, with the most significant economic and social shocks since the Great Depression of the 1930s. I believe this should finally force us into a fundamental and long overdue re-evaluation of our personal, societal and global needs, beliefs and expectations as a species, and the impacts these are having on our social, economic and natural worlds. These should be recognized as interconnected and co-dependent, however under current neo-conservative linear-thinking in a non-linear world **are not**. Climate change has been a significant affront to neo-conservatives (thus the wide-spread, right-wing denial) since it holds that what comes out of our homes, cars and trucks, factories, airplanes, intensive agriculture, and the oil and gas industry, coupled with significant world-wide deforestation and forest degradation, has had direct and serious implications for the long-term health of the planet. These in turn are beginning to have serious impacts on food production, human health, ocean levels and salt-water intrusion, marine storm surges, intense weather events, flooding, water supplies, and the frequency and intensity of wild fires.

In a recent opinion-piece in the Manchester Guardian, entitled "Hope in a Time of Crisis", Rebecca Solnit wrote "At moments of immense change and dislocation we often see with new clarity the systems – political, economic, social, ecological – in which we are immersed as they change around us. We see what's strong, what's vulnerable, what's corrupt and incompetent, what matters and what doesn't." We have the chance, in the light of COVID19, to critically examine where we are, how we got here, our successes and failures, and how we can move forward in more positive and sustainable directions. In the current context, it's not surprising that Americans, who are prone to addressing every problem through the lens of individual rights and freedoms, would struggle with how to deal with the collective demands of a pandemic. Short of war, Americans don't have much of a national vocabulary for talking about disciplined cooperative actions or for applying these in response to crises.

What follows are my personal musings on the priority issues needing to be addressed, and at least an interim way forward. It's worth pointing out here, in an American context, that in the 75 years since the end of WW2 seven free-enterprise Republican presidents and administrations have been in power for a total of 45 years, compared to six Democratic administrations for a total of 30 years, many of the latter "hamstrung" by Republican majorities (and malignant individual politicians such as Mitch McConnell and Lindsey Graham) preaching the neo-conservative gospel in the House and Senate.

1. Climate Change (and phasing out of fossil fuel dependence)

There is overwhelming scientific evidence that an increasing atmospheric concentration of "greenhouse gases" – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), low-altitude ozone (O_3), and chlorofluorocarbons (CFCs) - is leading to a significant warming of the earth. The past decade was the hottest ever recorded globally, with 2019 the second warmest year on record. Each decade since 1980 has been warmer than the preceding decade, with the period between 2010 and 2019 the hottest yet since worldwide temperatures records began to be collected in the 19th century. The six years from 2014 to 2019 have been, collectively, the warmest on record.

In British Columbia, predictions of the degree of warming vary, but the most commonly accepted estimates are that B.C.'s mean temperatures may increase by between 1.5 and 4.5^0 C over the next 3-5 decades. Changes at the lower end of this range would be fairly innocuous, while the higher end of the range would represent the greatest change since the last ice age. Mean temperatures could rise on average by 2.4^0C in summer and 2.9^0 C in winter by 2100. Nothing in our knowledge of evolution suggests that plant and animal communities can adapt so quickly to changes of this magnitude. The predicted results of such a change in British Columbia are a sea level rise of 1-3 meters, extreme weather events, significant ocean storm surges, a redistribution of freshwater resources, serious impacts on food production, and ecological disruptions and species extinctions on an unprecedented scale.

It has been suggested that the answer to global climate change lies in so-called "green solutions" – major tree planting programs (the "Trillion Trees Proposal" by Zurich-based Crowther Labs-ETH), and the World Bank's REDD+ program (reduction of emissions from forest degradation and deforestation, where carbon emitters can offset their emissions by purchasing carbon credits from forests protected through the REDD program). Both proposals have been enthusiastically supported by the fossil fuel and transportation industries because they rely entirely on highly speculative "carbon offsets" rather than measurable carbon emission reductions.

The rationale for REDD and other "Green Solutions" was established in the following statement from the 2014 U.N. Climate Summit in New York:

> "Reducing emissions from deforestation and increasing forest restoration will be extremely important in limiting global warming to 2^0 C. In fact, forests represent one

> of the largest, most cost effective, climate solutions available today. Actions to conserve, sustainably manage and restore forests can contribute to economic growth, poverty alleviation, the rule of law, food security, climate resilience and biodiversity conservation".

New York Declaration on Forests, U.N. Climate Summit, New York, 2014

I am firmly convinced that natural forest protection and rehabilitation have a significant role to play in mitigating and stabilizing the impacts of carbon emissions, however I really question the contention that "forests represent one of the largest, most cost effective climate solutions available today". This is the fable peddled by the "Green Solutions Brigade" whose views are much supported by the fossil fuel, land transportation and aviation industries. Simply translated "We don't have to cut back on, or make more efficient use of, our fossil fuel consumption, we just have to plant more trees".

Basic Principle Here:

TREES ARE NOT CARBON SINKS. THEY ARE VARIABLE, TIME-LIMITED CARBON STORES. FOSSIL FUELS IN THE GROUND ARE ONE OF THE ONLY RELIABLE LONG-TERM CARBON SINKS AND THEIR USE IS CURRENTLY THE LARGEST ANTHROPOGENIC SOURCE OF GEEENHOUSE GAS EMISSIONS.

I'll deal first with the REDD program which is administered by the World Bank's Carbon Partnership Facility. It consists of two steps: first, a constructive analysis of the causes of deforestation and forest degradation and possible solutions (REDD+) and second, if the first report is accepted, a proposed implementation/investment program for REDD funding.

From 2010 to 2015 I reviewed REDD+ submissions from seven countries with which I had some experience: Laos, Vietnam, Indonesia, Bhutan, Pakistan, Mongolia, and Belize. Only the reports of Laos, Bhutan and Belize were judged fully acceptable but of these only Laos decided to go to the next step of an investment plan.

The basic problem with most REDD proposals was that countries seemed to do a pretty good job of identifying the reasons for degradation and deforestation – poor legislation, inadequate land use planning and controls, little real law enforcement capacity, poor silvicultural and harvesting practices, and significant criminal activity. However when it came time to propose solutions, instead of things that would lead to real improvements in forest protection and management, most opted to create a carbon market. The main problems with this are: 1) in very diverse tropical forests, creating a reference level against which to measure change in carbon stocks is hideously expensive and speculative; and 2) a carbon market cannot function effectively if governance is systemically corrupt which, unfortunately, is the rule rather than the exception in much of the developing world. One of the less credible proposals was from Pakistan, which declared its intention to create a carbon market on all their natural forest areas. The problem is that the only significant natural forests in Pakistan are the Blue and Chir pine forests of the Northwest Frontier Province, which was largely under Taliban control

at the time, so good luck on trying to enforce forest laws and getting your forest officers back alive.

There are four fundamental scientific problems with the so-called “green solution” programs when it comes to climate change mitigation:

1. Leakage: While deforestation may be avoided or reduced in one area, forest exploitation and degradation may simply shift to a different locale.
2. Additionality: It is impossible to estimate what might have happened in a given area had such programs not been implemented.
3. Permanence: Carbon stored in trees is only temporary, i.e. all trees will eventually die, be attacked by insects, or in drier climates may be subjected to catastrophic wildfire, and release carbon back to the atmosphere.
4. Measurement: Accurately measuring the amount of carbon stored in forests and forest soils is extremely complicated, and prone to significant errors, especially in complex and species-rich tropical forests.

I have had serious concern over the lack of clear criteria in so-called “Green Solutions” in judging the acceptability and relevance of programs. Perhaps even more important are the difficulties of establishing clear standards for the methodology of determining reference emission levels and estimating/projecting future emissions under different land and resource use alternatives - which to me is a key to developing appropriate natural carbon reduction and sequestration programs.

More important, I believe that REDD analyses are being used to discredit those cultural practices of rural populations that are considered "inconvenient" by the economic elites, and thus bias land use decisions For example, throughout many of the documents that I've reviewed there is a recurring theme of discrimination against tropical rotational swidden agriculture as practiced by ethnic minorities outside the major floodplains, coastal lowlands and volcanic soils. Economic elites in parts of east and southeast Asia and perhumid Africa consider those who farm poorer upland soils by rotational methods as "backward and primitive". In fact, as I’ve stated earlier, just the opposite is true and peasant rotational farmers have evolved highly sophisticated and sustainable practices to deal with the reality of their environments.

The imposition of more sedentary agricultural practices on swidden farmers, under the guise of reducing carbon emissions, is being pursued without much attention to where it might be possible and desirable, especially in relation to soil productivity. The dominant soils of the upland tropics (floodplains and volcanic soils excepted), such as those derived from ancient, neutral to acidic sedimentary/metamorphic rocks, are not capable of supporting static agriculture, and when sedentary agriculture is imposed, serious, long-term site degradation and loss of village food security are common consequences. As noted earlier, such soils have been farmed sustainably for centuries by traditional rotational agricultural systems involving a cultural period of 1 to 3 years and a fallow period of 5 to 15 years. These systems are both ecologically sound and technically sophisticated, involving a considerable traditional

knowledge of inherent soil fertility and a great diversity of crop species, both agronomic and native.

In one particular recent REDD report it was contended that annual CO_2 emissions per hectare over the period 2012-2020 from swidden cultivators were estimated to have been 25% higher than those from extensive forest conversion to commercial tree-crop concessions. This seems hardly credible given that swidden is cultivated on secondary vegetation in small, incompletely cleared plots by household hand labour with no significant petroleum-based inputs. On the other hand, conversion to commercial cash crop production, particularly over this time-period, involved total vegetation removal (including stumps) of intact natural forests by heavy equipment, burning of all vegetation residues (with significant regional air quality impacts), mechanical cultivation, clean weeding, significant fertilizer and pesticide inputs, mechanical-harvesting and crop processing, marketing and transportation. It says something about the technical competence of the bureaucrats that they could even advance such a ridiculous assertion.

The "Trillion Tree Program" was proposed by a Zurich-based environmental "think tank", Crowther Labs-ETH and the Forestry Department of FAO (very ironic given FAO's historic role in converting native old-growth temperate and tropical forests to single species exotic wood plantations). It was detailed in a paper entitled Global Tree Restoration Potential by J.F. Bastin, Y. Fingold and C. Garcea. The study claims that:

> *"*We mapped the global potential tree coverage to show that 4.4 billion hectares of canopy cover could exist under the current climate regime*. Excluding existing trees and agricultural and urban and industrial areas (in other words most of the "developed world"), we found that there is room for an extra 0.9 billion hectares of canopy cover, which could store 205 gigatonnes of carbon in areas that would naturally support woodlands and forests. This highlights global tree restoration as our most effective climate mitigation strategy".

* To my mind this "qualification" of **current**, rather than **projected** climate regimes under global warming, is one of the single biggest fallacy of the whole exercise, since it flies in the face of any concept of long-term sustainability, and is a future recipe for millions of hectares of stressed, dying and dead trees. (Bear in mind that tree planting time horizons for Carbon sequestration will be in the neighbourhood of several hundred years and will extend much beyond the current climate regimes posing a real challenge in species selection as climate warms).

Not surprisingly, the paper has been enthusiastically received by the fossil fuel and transportation industries, but less so by climate scientists and vegetation ecologists. Examples of some of the scientific criticisms are:

- "The 200 billion tonnes of carbon the study claims would be sequestered represents less than one third of human-produced carbon dioxide emissions since the industrial revolution, and less than 20 years of emissions under current rates. Forest restoration and rehabilitation may have a role to play in greenhouse gas reduction, but it is very far indeed from 'the best climate change solution available' and a long way behind simply reducing fossil fuel consumption."

- "We show that Bastin et al. (i) overestimated soil carbon gains from increased tree cover by a factor of 2; (ii) modeled new tree cover in regions (grasslands and open savannas) where trees would reduce the albedo effect and actually increase climate warming; and (iii) relied heavily on afforestation of grasslands and savannas – biodiverse ecosystems where low severity fires and large herbivores have maintained sparse tree cover and stored soil carbon for millions of years."
- "The carbon sequestration estimate of Bastin et al. is also dependent on the false assumption that natural grasslands and savannas with fewer trees than predicted by "their statistical model" are "degraded" and in need of restoration. Ecological restoration of savannahs and grasslands rarely involves planting trees, and more often requires removal of woody plant invasives (which can be converted to bio-fuels) and low-intensity prescribed fire to promote biodiversity and ecosystem services."

The proposal seriously underestimates the logistics of an afforestation task of this magnitude, the availability of suitable propagation materials to support such a diverse and ambitious program, and the social and food production impacts on the indigenous peoples whose lands this proposal primarily targets and would expropriate. In short, it was a desk exercise by a bunch of "computer geeks" with little or no practical ecological or social expertise. Although properly conceived and carefully implemented ecological restoration can have a role in mitigating climate change, it is no substitute for the fact that fossil fuel production will need to be significantly curtailed in order to meet the targets of the Paris Agreement and longer-term reductions in carbon emissions. Such action should be accompanied by policies that prioritize the conservation and ecological recovery of intact, bio-diverse ecosystems, irrespective of whether they contain trees.

So, yes, selective "heroic" tree planting (not to be confused with credible ecologically-based forest ecosystem restoration/recovery) might help in a limited way, but it is time to stop suggesting there is a "nature-based solution" to continued fossil fuel use at its current levels. Sorry folks - there just isn't! We just have to reduce our own domestic use, and stop "pimping" fossil fuels to other parts of the world in return for cheap consumer goods, which are in turn "pimped" on the backs of local, seriously exploited workers. This relationship is neither environmentally nor socially sustainable.

The trillion-tree program has been rightly described as "A naive and dangerous distraction from the need to reduce our use of fossil fuels and leave more in the ground." Probably the biggest black mark against this lunatic scheme is that Donald Trump thinks it's a really great idea (right up there with using Lysol and Javex) as an internal purge against COVID19.

As a final post script to the trillion-tree proposal: In a 2019 interview with the British publication 'The Economist', Dr. Cowther the founder of Crowther Labs–ETH admitted "It's not like 200 gigatons are really going to come out of the atmosphere immediately and it would be amazing if we ever reached 10% of that full potential".

Major debate around the climate crisis appears to have now, belatedly, taken a significantly-enhanced focus on the real problem – the burning of fossil fuels and resultant increase in atmospheric greenhouse gasses. This year's UN Climate COP26 (Conference of the Parties) climate talks in Glasgow were to have led to major emission reductions. Participating

countries were to have submitted plans before attending COP26 to cut global carbon emissions by nearly half by 2030 and to limit the level of global heating to 1.5 degrees C above pre-industrial levels. Though most COP participants had done so, the plans were not nearly strong enough, and analysis demonstrated that in combination they would still lead to a catastrophic 2.4 degrees C of further heating. The gap between the targets proposed and the actual cuts required had been known before COP talks began, and what was seen to be crucial in Glasgow was to make realistic commitments to close it. Glasgow, after two weeks of intense debate, set a path forward, with countries agreeing to return in 2023 and 2024 to negotiate the necessary final amendments. The major sticking point centers on a vital clause to "phase out" coal-fired power generation. The international Energy Agency has said that 40% of the world's 8,500 coal-fired power stations must be closed by 2030, and no new ones built, if we are to stay within the 1.5C target. It may not seem controversial, in the light of this, for an agreement on the climate to refer to the need to reduce the use of fossil fuels, but since the Kyoto protocol in 1997 there has been no such reference in COP decisions, primarily at the insistence of China and India – major coal producers and users. The inclusion of such a reference in the Glasgow recommendations to a "phase-out" of coal was a major step, but at the last minute China and India objected to the wording and they insisted it was amended to "phase down". The last minute change is unfortunate but is unlikely to slow the momentum to move past coal – a dirty fuel from a previous century.

2. Deforestation

In my international forestry work one of my main challenges has been to discourage ill-considered artificial plantation/reforestation programs because I think they are usually completely mismanaged and can have significant detrimental impacts on natural forest composition and the long-term productivity of many tropical soils. In my environmental impact assessments I have stressed silvicultural programs that preserve and enhance native forest structure and composition, promote natural regeneration, and limit nursery and planting programs to situations of demonstrated reproductive failure.

One of my major interests and concerns has been the impact of many commercial forestry projects on indigenous forest-dwelling peoples and the ecological resources that sustain them. In my years as a consultant I've witnessed the destruction of tropical and sub-tropical rainforests in many parts of South East Asia - Sumatra, Borneo, New Guinea, Cambodia, Malaysia, and Burma - for conversion to uses that are simply unsustainable, generate significant carbon emissions, and have had serious impacts on biodiversity and the welfare of indigenous peoples.

3. International Dialogue and Cooperation

Communication and positive coordinated actions at the international level have seldom been so dysfunctional and there are currently few positive forums to deal with important emerging multi-lateral issues – some of which are discussed in more detail in the following sections. Understandably the current priority will be bringing the COVID19 pandemic under control. As this is being accomplished, however, we should also turn our attention and our resources

(preferably through the United Nations and its agencies) to developing coordinated responses to emerging global political, social and environmental problems in some of the world's current trouble spots – the Amazon Basin, Syria/Iraq, Palestine/Israel, Southern Arabia - Yemen, and the Persian Gulf, Afghanistan (still!!), Indonesia - Irian Jaya, China - Hong Kong and the Xinjiang Uyghur Autonomous Region, Myanmar and the Rohingya, the USSR and much of Eastern Europe.

4. Improving the Functioning of Multilateral International Organizations

The "alphabet soup" of these international organizations* was largely created immediately after World War II under the broad U.N. umbrella, to assist in coordinating activities between countries in specific development, scientific and social sectors that transcend national boundaries.

> * Education, Scientific and Cultural Organization (UNESCO); Food and Agricultural Organization (FAO); Industrial Development Organization (UNIDO), International Court of Justice (ICJ); International Criminal Court (ICC); International Labour Organization (ILO); International Monetary Fund (IMF); Organization for Economic Cooperation and Development (OECD); the World Bank (WB) and associated regional banks (Asian Development Bank and Inter-American Development Bank); World Food Program (WFP), World Health Organization (WHO); World Trade Organization (WTO), United Nations International Children's Emergency Fund (UNICEF).

When the world community, under the political leadership of Franklin D. Roosevelt and Winston Churchill, set up these international multi-lateral agencies, they set lofty goals for cooperation, coordination and communication but then balked at giving them the tools to effectively carry out those mandates, or in some cases even establishing clearly what those mandates were. Over seventy years on this international system is in some disarray, with many gaps and areas of duplication, and even conflicting jurisdictions and objectives. There is a clear need to incrementally revisit and rationalize the whole international management system and establish constructive linkages to individual regional and national objectives and programs, but it is not clear who might initiate this process, given that the UN Security Council seems to have abdicated its coordinative responsibilities in this regard.

For example, in the current context of assessing trends in public health and incidences of disease in the current light of COVID-19, the World Health Organization (WHO) has absolutely no authority to collect independent data or even attempt to influence, for consistency, how national data is collected and analyzed. It must simply accept what it's given by the respective governments. Perhaps the current pandemic will change this and build a more effective WHO - we can only hope because it's obvious that we need credible information and reliable international oversight and coordination if we're to respond effectively to future health crises - **and those will come!!** Donald Trump's pathetic attempt to blame anyone but himself (first the WHO and then the incredible Dr. Anthony Fauci) for his own bumbling response to COVID-19 was simply the latest example of his absolute stupidity, lack of integrity, and his general reflection of the American right-wing's antipathy to multi-lateral cooperation and communication.

To deal with COVID-19 and its aftermath, the UN has established a "Response and Recovery Trust Fund" involving agencies such as the WHO, WFP, and UNICEF, but until now all of the response is from individual UN agencies. Thus far the UN Security Council has provided little leadership and coordination, though the pandemic clearly is a significant threat to international peace and security. As recently as May 15th the Security Council once again demonstrated its incompetence by failing to support a global military ceasefire to facilitate the fight against COVID19.

5. Encouraging and assisting developing countries in improved governance

This is obviously a very sensitive issue, since it involves international assistance/ intrusion into areas of national jurisdictions. However, there are many instances of incompetence and dysfunction, and even malevolence, by individual governments that negatively impact their own citizens, particularly indigenous peoples, and the "global commons" (the actions of the malignant Bolsonaro government of Brazil being a prime example of both). The international community must develop processes that can impose significant penalties on governments that fail to control practices that degrade ecosystems of global importance (such as major freshwater wetlands, tropical and temperate rainforests, peat and swamp forests, mangrove forests and coastal reefs), and threaten the livelihoods of indigenous people who depend on them for survival. These penalties could include punitive trade sanctions, withdrawal of foreign aide funding, exclusion from international treaties and agreements, and international travel restrictions on government officials.

6. Assessing the impacts of major development projects

Environmental and social impact assessment (ESIA) processes provide a valuable tool to identify and address the negative impacts of development projects and programs, however they vary widely in scope, intent and effectiveness between jurisdictions. Among the most comprehensive and effective of these are those applied by The World Bank to a broad array of development projects seeking World Bank funding, and these could be used as a model for such processes in other jurisdictions. The World Bank process requires not just an assessment of environmental, social and economic impacts but also a comprehensive program to mitigate negative impacts and enhance positive aspects of a project. Individual international donors providing support for foreign aid projects (particularly the Chinese government which is rapidly becoming a major donor to Third World development) should include both funding and technical assistance for appropriate project design and environmental/social assessments.

Projects that would be priorities for application of expanded ESIA processes include the following:

i. International and Regional Roads and Railways

In Editorial Comment #12, I described the suspected links between access development and the evolution and spread of epidemic diseases, particularly in tropical and sub-tropical regions. In my experience, issues such as these are currently being considered in assessing the consequences of new road proposals only by the World Bank and its associated regional banks. These organizations have refused to consider financing new access roads without a comprehensive engineering and environmental design and assurance that effective enforcement processes are in place to protect against deforestation, environmental degradation, disruption to indigenous communities, and resource theft. Given the potential consequences of access development it seems essential that such processes be applied to **all** major inter-regional and international road proposals. All of these should be assessed, and mitigation measures committed to, in an environmental, social and economic impact assessment (ESIA) process before construction approval and funding.

Current access and transportation proposals that should be subject to impact assessments include the Chinese Government's Belt and Road program, the purpose of which seems to be to give China increased access to both raw materials and markets for its manufactured goods. It is currently focused primarily on Africa and Central and Southeast Asia. However, there is increasing evidence that it is expanding into South and Central America. It may now include support for the Brazilian Bolsonaro Government's Amazon to Andes regional road proposal. None of these major infrastructure initiatives appear currently to be subject to engineering, environmental and social assessments of any kind.

ii. Water Resources: Access to Quality and Quantity

Secure access to quality water is a fundamental human need - for human and livestock consumption, agricultural irrigation and hydro-power generation - and thus water use is a potential source of conflict world-wide. Some of the most serious current and potential areas of conflict over water resources are:

Region	**River Systems**	**Countries**
Middle East	Tigris, Euphrates Jordan Nile	Turkey, Syria, Iraq Israel, Lebanon, Jordan, Palestine Egypt, Ethiopia, Sudan
Central Asia	Aral Sea and tributaries	Kazakhstan, Afghanistan Uzbekistan, Tajikistan, Turkmenistan, Kyrgyzstan
Indian Sub-continent	Indus and tributaries. **Pakistan**: Indus, Ravi Chenab, Jhelum. **India:** Beas, Ravi.	Pakistan, India
East Asia	Mekong	Myanmar, Thailand, Laos, Cambodia, Vietnam, China

Water allocation in the Indus River is established through the Indus Water Treaty (!960). Water allocations in the Mekong River from 1978 to the present were shared amongst

Myanmar, Thailand, Laos and Cambodia by the Mekong River Commission. More recently the Chinese Government has begun to unilaterally construct major dams (e.g. the Three Gorges project) in the Mekong headwaters (the Salween River) with minimal reference to the other parties. Thus far China has refused to participate in the Mekong Commission except in an "observer" status.

Elsewhere in the region, two U.N. organizations are involved in adjudicating water disputes on a case-by-case basis: 1. the UNESCO - PCPC (Potential Conflict to Potential Cooperation Mission) and 2. the World Trade Organization (WTO) which arbitrates disputes between its members that are commercial in nature. Both are voluntary processes and there are no identified mechanisms to enforce the results.

iii. Large-Scale Energy Projects

The most intrusive of energy projects involve hydroelectric power generation. The direct impacts of a typical large-scale project will include roads for facilities construction and maintenance, dam(s), borrow pits, the area occupied by the main reservoir(s), canals, penstocks, powerhouses, switchyards, land dedicated to the construction of the dam itself, and power lines for the distribution of the generated electricity. Indirect impacts may include significant alteration of river flows below the reservoir (particularly during the period of initial reservoir filling), displacement of people living in the area of impact, the loss of fisheries and other aquatic resources, and the loss of local infrastructure - all of which will require compensation and possible human resettlement. The World Bank, after its experience with the Sardar-Sarovar project in India, which was one of the largest electrical generation projects in the world at the time, prepared (with the assistance of Canadian Chief Justice Thomas Berger) a retrospective review of the project which provides excellent guidelines for the assessment and management of the environmental and social impacts (especially community resettlement) of major hydro-power generation projects.

iv. Mines and Mineral Developments

Mining is the process by which metallic and industrial minerals, coal and aggregate resources are discovered, extracted and concentrated prior to final processing and industrial use. The major components of the process, for large-scale projects, which must be included in an ESIA, are:

1. Exploration: Exploration activities range from reconnaissance mapping and hand collection of rock samples to intensive drilling and adit workings to define the extent of the geological formation and to collect samples for assay.
2. Mine development: Mine development involves purchase and delineation of the mine property, construction of facilities and infrastructure, and initial excavation to access the geological formations.
3. Mine operations: Mine operations involve one of the following mine types: surface mining (strip, open pit, quarry) where deposits occur at shallow depths; and underground mining where ore deposits occur at depth and are mined in shafts or through caving. Surface mining produces more waste material, which will require

safe and stable disposal and storage, generally outside the mining area. Waste materials from underground mines are often returned to back-fill the mined-out workings to minimize surface collapse and subsidence.

4. Benefaction or concentration: Benefaction is employed to separate coal or ore from the host rock. The process usually generates significant amounts of wet "tailings" that must be disposed of in properly designed, stable impoundments or tailings ponds. Concentration involves the separation of valuable minerals from the other raw materials. It is only necessary if the product from benefaction isn't pure enough.
5. Mine closure and rehabilitation: This is the final stage of the mining process, initiated after the resource is exhausted. The objective will be to leave the mine-site in a productive state that does not constitute a risk to public safety or environmental health. Legal obligations for mine closures are generally established in legislation.

In addition to large-scale mining projects, throughout a significant part of the developing world there is an informal (or artisanal) gold-mining sector consisting of small operators who use mercury to extract gold from raw ore. Gold-bearing ore is pulverized and mixed with elemental mercury, which dissolves the gold to form a semi-liquid amalgam. The amalgam is separated physically from the residual rock materials and then heated to vaporize the mercury, leaving behind the gold. Artisanal gold mining accounts for between 15 and 25% of total world gold supply. Between 10 and 19 million people use mercury in the mining of gold in more that 70 countries making small-scale gold mining the largest source of mercury pollution in the world. Mercury poisoning causes kidney damage and impairs cognitive and neurological function in adults, and causes physical and mental disabilities in children, and damage to unborn fetuses.

One of the countries where small-scale gold mining has had the most serious impacts is Brazil. Gold miners (or garimpeiros) are major supporters of President Bolsonaro and his government, and are subject to no regulations or controls. They have been allowed to mine in national parks and protected areas, and reserves legally set aside for indigenous Amerindian peoples. The garimpeiros invasion has brought malaria, prostitution and venereal diseases, and violence to indigenous peoples, and mercury contamination of the freshwater fisheries and water resources on which they depend. The Bolsonaro Government has thus far shown no inclination to regulate the miners or to protect either the Amerindian peoples or the environment.

A very creative solution to the mercury problem, pioneered in Venezuela and subsequently further developed by the United Nations Industrial Development Organization (UNIDO), with technical support from the University of British Columbia's Centre for Mining Technology (CTEM), is termed UNECA or Unit of Gold Extraction and Controlled Amalgamation. In this process the miners bring their initial concentrates to a central village facility to be safely amalgamated for a small fee by trained technical operators. Mercury is recovered by heating and condensation under fume hoods, and sold back to the miners at a minor cost for reuse. These centers can also provide miners with reliable information on protecting themselves, their families and their community from mercury poisoning.

Post Script: When I was working in Mongolia in 2004 I visited a major alluvial gold mining area. I was invited into a ger (Mongolian yurt) for a cup of tea and was served by a young woman who was obviously pregnant. On a stove in the background, dinner was being prepared but there was also a small simmering pot on the back burner in which gold amalgam was being "burned" to vaporize the mercury. I was told that men do the excavating and women do the amalgamating indoors, which didn't seem to me to be a very good idea for young women of childbearing age, or even for the rest of the family if they eat at home.

8. Financial "Bail-Outs" of COVID-Affected Industries

The COVID-19 crisis has significantly impacted the petroleum and transportation industries (oil companies, airlines and the travel sector, and auto manufacturers), and as with the 2008 financial crisis there have been calls for government interventions in the form of financial bailouts. We should learn from the lessons of 2008 financial crisis when these same sectors received considerable sums of public money, which were spent reconstructing the same old dirty, high-energy, high-carbon economies. In dealing with the inevitable pleas from the petroleum sector, the airlines and travel industries, government should provide support only to affected workers, and the companies should be forced to restructure or be allowed to fail, without public assistance.

Earlier, in response to COVID-19 and requests from the Alberta Government and the Petroleum industry for financial assistance, the Federal Government's widely-applauded aid package was aimed at employing laid-off oil-patch workers to reduce the pollution emissions (natural gas and methane - both greenhouse gases) from a large backlog of abandoned oil and gas wells. These facilities should have been subject to Alberta and Saskatchewan Government performance bonds under the permitting processes, but the bonds were never adequate to cover the anticipated remediation and abandonment costs when the companies defaulted.

9. Protected Areas: World Heritage Sites, Parks, Public Lands and Ecological Reserves

Protected public lands fulfill a number of valuable functions including natural area recreation, public education, preservation of representative natural landscapes, protection of representative terrestrial and aquatic fish and wildlife habitats, and sustainable low-intensity uses under permit such as domestic cattle grazing and collection of certain forest products. Ideally all countries should recognize a responsibility to the "global commons" and establish comprehensive, interconnected networks of protected areas to manage, preserve and monitor natural genetic resources – all of which to establish a baseline against which to measure human-induced ecological change.

The United States, since the early 20th Century and the administration of President Theodore Roosevelt, has been a leader in sustainable public land conservation and management. The three primary agencies responsible are the U.S. Department of the Interior, the U.S. Forest Service and the U.S. Bureau of Land Management. The lands remain under Government

ownership, and control of use is by time-limited licenses or leases, with limits on the degree of use to ensure sustainability. These U.S. agencies have served as a model for the establishment of similar federal and provincial agencies in Canada and other jurisdictions.

Then along came Donald J. Trump and his tame "Mini-Me" bureaucrats – in this case William Perry Pendley, the Acting Director of the Bureau of Land Management (BLM) at the time. Pendley was a neo-conservative lawyer who declared his management philosophy in an interview with the National Review magazine in 2016 when he said "The Founding Fathers intended all lands owned by the Federal Government to be sold" (he chose not, however, to disclose the mechanism by which he communicated with the "founding fathers"). In 2017, in a speech criticizing the Endangered Species Act, which he was responsible for enforcing on the 970,000 sq. km. of Bureau Lands, he proclaimed "This is why out west we say shoot, shovel, and shut up if you discover an endangered species on your property" (he was caught on tape with a snickering aside to the audience - "And I have to say as a lawyer that's not legal advice"). Pendley and his superiors were responsible for forcing the relocation of the BLM headquarters from Washington D.C. to Grand Junction Colorado - a move that made no sense and resulted in significant senior staff resignations, and thus the loss of critical institutional memory. Environmental and governmental institutional observers launched a lawsuit challenging the legitimacy of Pendley's appointment but this is was not resolved before the November election, by which time the situation had been resolved. Apparently the U.S. government has a rule that "Acting Positions" are time-limited and subject to termination at any time thereafter unless reconfirmed. On September 25th, 2021 Mr. Pendley was declared "surplus to requirements" and his appointment was terminated.

10. Women's Rights: Education, Personal Safety and Economic Security

The social and economic status of women has a significant influence on their own physical and psychological health, but because of their crucial role in the family, also influences the health, prosperity and education of their partners, children and communities. Worldwide, poverty rates for women are substantially higher that those for men, across all racial and ethnic groups. Domestic and sexual violence against women can lead to a cycle of injury, poor health, poverty, and homelessness for women and their children. Investments in dedicated social, educational/vocational and financial aid to women have been demonstrated to have very substantial positive benefits for the prosperity of both families and local communities, and should be prioritized in ongoing and future domestic and foreign aide programs.

11. Changing Nature and Patterns of Work

Prior to the coronavirus pandemic between 5 and 7% of employees, depending on sector, worked from home. Over the past several months millions more have joined them. With predictions that some lockdown measures could stay in place until mid-late 2022, many companies are contemplating a major cultural shift – regular working from home (WFH).

Clearly WFH won't work for all people or all organizations. It works best for organizations like consulting firms where most projects are commissioned from outside and are carried out by individuals or small working groups within the same firm. Coordination of work is the responsibility of either a single manager or a small management team. It obviously does not work in situations where staff are required to be continually present (such as the retail and commercial banking sectors) or where a significant number of people in different departments of the same organization must work together to complete complex, continuous activities that require on-going, day-to-day consultation and coordination. Thus it works best in sectors such as the media, technology, and financial services, and for time-limited projects. Where it is appropriate it should result in more meetings conducted on-line, less corporate travel, greatly reduced office space, and significant cost savings. Outside the office, significantly increased WFH should have the capability to reduce the volume of daily commuter traffic and commuting times, air emissions, and the pressures on public transportation.

12. The End of Obsolescence: Resource Recovery, Recycling, Re-use and Repurposing

British Columbians generate about 2.5 million tonnes of solid waste per year, a figure that remained remarkably stable from 2012 to 2017. However, there was an increase in the following few years, thought to be due to higher levels of personal consumption and a strong real estate market that resulted in more waste generated from moving and the renovation/demolition of older homes. This is a cause for concern because many municipal landfills are approaching capacity. Exactly what effect the current pandemic and its aftermath will have on solid waste generation is uncertain. It does seem likely, however, that the future regulation of the industry will see some or all of the following:

- higher fees for landfill disposal that will better reflect the true disposal costs;
- pricing mechanisms on certain categories of consumer products that will encourage recycling and reuse;
- greater emphasis on composting and organic diversions;
- waste-to-energy technologies; and
- "extended producer responsibility" programs which place more onus on manufacturers for waste reduction and recovery.

In particular, products should be designed to last longer, producers should use fewer "virgin" raw materials and more recycled products, and plastics should never become "waste" but should be part of a circular economy that keeps it and other persistent, long-lasting materials in long-term use. We have to abandon the habit of burning more fossil fuels to make, use for a short time, and then throw away things that we just never needed in the first place.

In short, we must change our attitudes about consumption, by buying less and re-using more of everything.

13. Agriculture: Food Security and Supporting Smaller-scale and Indigenous Food Production

Though western agriculture achieves high production per unit area, it fares badly in comparison to some "more primitive" agricultural systems when viewed from criteria of sustainability and energy efficiency. The energy efficiency of western agriculture has declined steadily since the beginning of the 19th century, the result of increased mechanization, the use of inorganic fertilizers, irrigation and pesticides, and a focus on animal protein production. In many respects western agriculture turns fossil fuels into food and in doing so has ceased to be consistent with the concept of sustainability. The secondary impacts of western-style agriculture are often long-term soil impoverishment, degradation of native terrestrial and aquatic ecosystems, and contamination of surface and ground water with fertilizers, animal wastes, and pesticide residues.

A recent article in the journal *Science*, entitled "Global food systems emissions could preclude achieving the 1.5 to 2 degree C climate change targets" (authors M. Clark and seven others), concludes "if we are to address the climate crisis we have to change what we eat". Even with immediate major reductions to other forms of direct fossil fuel use, emissions from food production alone if not reduced would be sufficient to miss the Paris Agreement's 2°C target. Agricultural emissions come from deforestation and land clearing, fertilizers, gaseous emissions of methane from sheep, goats, and cows and their manure, methane from rice growing, and the fossil fuels used in supply chains and food processing. The authors propose adopting a plant-rich diet containing much lower amounts of dairy, eggs and meat, reducing the amount we eat, improving crop yields, reducing food waste, and reducing use of nitrogen fertilizers. The authors of the paper stress that they do not recommend a vegan or vegetarian diet. "From a psychological perspective, communicating 'eat less meat' seems to be a more effective way to get people to shift their dietary habits than is 'eat no meat'."

By comparison, as discussed elsewhere, indigenous agriculture in the developing world relies on significantly lower commercial (fossil fuel-based) inputs and thus under proper management has a much higher level of sustainability. Indigenous tropical agricultural systems are of two broad types:

- Static agriculture occurs on nutrient-rich, youthful volcanic soils and those alluvial soils on the deltas and floodplains of major rivers, where fertility is maintained by regular seasonal sediment deposition. Both of these are generally the soils that have been cultivated for centuries for intensive rice production by what have become the dominant "cultural and economic elites" in many of these developing countries.
- Traditional swidden or rotational (often incorrectly termed "shifting") cultivation is a world-wide phenomenon on the majority of tropical soils, such as those that occur on older upland geological formations, and are highly weathered and generally nutrient poor. Soluble nutrients on large-scale, mechanically-cleared and broadcast-burned sites are quickly leached away in the rainy season and sites become quickly degraded – the important point here is that most of the nutrients on a site are stored in the vegetation and slowly decomposing litter rather than the soils.

Peoples farming such marginal lands have evolved very sophisticated practices to deal with the realities of their environment generally termed "Swidden (or rotational) cultivation",

which is characterized by the retention of organic matter. In this form of cultivation, vegetation is cleared to form small irregular plots and the debris is lightly burned so that the ash can act as a fertilizer. The clearing is incomplete, partly due to the limitations of hand tools, but also due to evolved ecological wisdom - useful native trees and shrubs are retained, and stumps and roots are left in the ground, both minimizing soil disturbance and providing for rapid re-growth when the plot is "rested".

Cropping is characterized by complexity and diversity, often involving as many as 20-25 varieties of introduced and native plants (and a much lower focus on animal protein). When crop yields begin to decline, generally between three and ten years, the land is allowed to fallow to native vegetation and the process of nutrient recovery begins. Farmers often use fallowed land for native and introduced perennial tree and shrub crops and for minor forest products over the 5-10 year recovery period.

These peasant farmers carry in their heads a significant fund of sound ecological knowledge about plant species and soil properties, referred to by tropical agricultural specialist Peter Richards (USAID) in a 1985 book as "the single largest knowledge resource not yet mobilized in the tropical agricultural development enterprise". This doesn't mean that traditional swidden practices can't be improved, but the wisest course of improvement is incremental change to practices that have stood the test of time under local conditions for many centuries. What is required is the recognition that, where the ratio of land to people is high enough to allow an adequate rotation (+/- 10 years), swidden can be adapted sustainably to many of the poorer soils of the tropics. Adaptations of, and improvements to, traditional swidden have much to offer existing and future agricultural development projects in the tropics, if only government planners would only listen.