Sustainable forestry and society: Where conflicts arise and solutions can be found Example Tropical Rainforest

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Baso kontserbazio eta gestioaren iraupenaren printzipio antropogenikoa gatazkatsua gerta daiteke gure-gurea dugun giza pentsamoldeagatik. Hala, balio edo baliabideen hondamendiak izugarrizko sufrimenduak ekarriko lituzkeen unean bakarrik bultzatuko litzateke eramangarritasuna modu eraginkorrez. Giza bizitzaren oinarrizko premiak aserik izango direnean bakarrik ziurtatuko da iraupena, eta soilki gizarte aberatsetan luxuak asebetzen badira. Txosten honek iritzi horiek indartzera datozen zenbait adibide ematen ditu.

Giltz-Hitzak: Ikuskatze antropogenikoa. Gestio eramangarria. Gizakien premiak.

El principio antropogénico de mantenimiento de la conservación y gestión forestal es un conflicto en potencia debido a nuestra mentalidad intrínsecamente humana. La sosteniblilidad solo se vería promocionada por la acción cuando la destrucción de valores o recursos ha desembocado en sufrimientos extremos. Sólo se podrá asegurar el mantenimiento si las necesidades básicas de la vida humana han quedado satisfechas, y si sólo satisfacen lujos en sociedades opulentas. Este informe proporciona algunos ejemplos que respaldan estas opiniones.

Palabras Clave: Inspección antropogénica. Gestión sostenible. Necesidades humanas.

Le principe anthropogénique de maintien de la conservation et de la gestion forestière est un conflit en puissance dû à notre mentalité intrinsèquement humaine. La soutenabilité serait promue par l'action seulement lorsque la destruction des valeurs ou des ressources déboucheraient en d'extrêmes souffrances. On pourra assurer l'entretien seulement si les nécessités de base de la vie humaine sont satisfaites, et si elles satisfont seulement le luxe dans les sociétés opulentes. Ce rapport fournit quelques exemples qui renforcent ces opinions.

Mots Clés: Inspection anthropogénique. Gestion soutenable. Nécessités humaines.

Sustainability as a principle of using resources and managing ecosystems was invented by foresters. It is essentially and intrinsically a mental artefact of human culture. It is rooted but not stuck in the natural hominid instinct of acquiring and safe-keeping of food, tools, shelter and position, originally at short time horizons to meet needs and satisfy desires for the foreseeable future. Human cultural advance and population growth brought with them longer time perspectives, but also increasingly overuse, abuse and misuse of the natural resources. Greater population densities and wider life experiences increased the discrepancies between aspiration and fulfilment, fuelling resource overuse and environmental abuse. Scarcities and sufferings resulted that affected daily life. Centuries of experience showed that the interests of future generations also were at stake. In response, the concept of sustainability was developed, first expressed in literature in 1713 by a German mining engineer for forestry which supplied the mining industry with timber and fuel. Eventually the concept of sustainability widened in accordance with the needs, aspirations, attitudes and priorities of the human society which changed in the course of cultural evolution. Thus, sustainability is a human artefact and a variable which is dependent on the shifting states and ideas of society. It is a convention of contemporary society that changes unpredictably with the changes of ethics, morals and spiritual and material needs of society. It is not a law of nature as natural sciences and history clearly show. Sustainability's greatest adversary is man's evolution of attitudes and habits from original habitat- and group-integrated short-range scavenger to modern emancipated long-range speculative predator.

Small and roaming groups of technologically weak human beings cannot and never could lastingly modify or degrade the resources on which they lived and depended. If they did, escape by migration was in the past always a possibility. This changed with cultural advance. Population grew and shifting (fallow rotation *cum* migration) and finally settled agriculture replaced collecting and hunting. Humanity liberated itself from the cruel but effective biocybernetic regulation which controlled population activities and densities. Consequently, population grew and capabilities increased, resource use intensified, forests were plundered and cleared, and landscapes degraded. The price was new, equally cruel forms of regulation. In China and Mediterranean Europe, this experience was made 3 millennia ago. Perceiving the threats from deforestation, the ancient intellectual elite, such as the Greek Plato and the Roman Cicero, called for intervention by government. A millennium later the Frankonian king Charlemagne, Emperor of the Holy Roman Empire, instituted forest laws and instructed his senior foresters to implement social and multiple-use forestry management effectively. Since then, the principle of sustainability in forest conservation and management evolved along a tortuous road in Central Europe and France. Advance alternated with set-backs regulated by population dynamics, quality of governance and climate changes. The 17th and 18th centuries brought scientific enlightenment, but also great sufferings from climatic extremes, famines of food, timber and fuel, diseases and social and economic inequity. With suffering grew public awareness and the pressure for change. Public programmes of afforestation, forest improvement and consolidation of native customary rights began in earnest in the devastated landscapes of Central Europe in mid 17th Century (Kremser, 1990, Mantel, 1965). The 19th century brought fossil fuel, fertilizers and crop breeding which gave foresters room to establish large scale pioneer forest.

In some colonial territories the problem of forest overuse and misuse was recognized in the late 18th century, but general public awareness and large-scale action were slow to come. By mid 19th century, sustainable forest conservation and management, and corresponding formal training at practical and academic levels, were firmly and effectively established and adequately supported by law only in France and Germany, and somewhat later in India

(Anon., 1961, Grove, 1997, Hesmer, 1975). Public efforts to secure sustainability of forestry and resource management have always, even to this day, been undermined by the primeval urges to obtain and maintain power, riches and prestige, equally in private, cooperate and public-political contexts. Consequently, the threat to the sustainable use of the common heritage of forest resources is still with us. The primeval basic motives (see Fig. 1) continue to fuel and drive the plundering of human and natural resources for assumed personal, communal or national gains. The history of tropical forestry during the second half of this century shows that private gain and satisfaction asserted themselves as dominant principles at the expense of sustainability. Biological evolution obviously has endowed the human species with an overwhelming and primitive instinct to acquire and dominate. Conservation and management of natural and human resources are categories of a state sophistication which is alien to those who are successful. The potential for social conflict and clash of interests between unbridled individual gain and society's needs for sustainability, therefore, is inherent to human nature and specifically intrinsic to the principle of forestry sustainability.

SUSTAINABLE FORESTRY IN TROPICAL RAINFORESTS, PRESENT STATE AND LATEST WHIMS

Selective logging (SL) versus selection silviculture management system (SMS) in tropical rainforests

The development of sustainable structure-controlled selection silviculture management systems in mixed broadleaf-conifer forests in Central Europe and Indo-Burmese forests has a long history of persistent unravelling of expatriate theoretical misconceptions and solving contradictions by empirical trial and error to final success at least in practice (Dawkins, 1997, and 1998). A century of evolution of tropical forestry towards holistically perceived, ecologically possible and economically feasible multi-resource sustainability lead eventually to a state of ecological, economic and social practicality and feasibility; the future course to sustainability seemed secure and appeared well charted (Anon. (1961), G. N. Baur (1962), D. Brandis (1860 in H. Hesmer, 1975), Bruenig (1998), H.G. Champion (1960), R. Catinot (1965. 1997), H. C. Dawkins (1958, 1997), H. Lamprecht (1989), P. W. Richards (1952, rev. 2nd ed. 1996), C. G. Trevor and E. A. Smythies (1923), F. H. Wadsworth (1997), T. C. Whitmore (1998) and J. Wyatt-Smith (1995) provide ample evidence). Scientific knowledge was adequate and practical experience sufficient to approach sustainability even in a changing world. Elaborate, but in essence practicable, logging and management codes, manuals and plans were abundantly available, e.g. India, Indonesia, Uganda, Myanmar, Malaysia, Philippines. Foresters in the 1950s were confident and empowered to enforce sustainable multi-purpose management in forest management units. But during the following four decades the previously strong political support of forestry faded. Politicians and economists questioned the relevance for developing countries of sustainability and the wisdom of keeping forest growing stock, arguing for liquidation, assuming high discount rates and productive re-investment of the proceeds in the country. The general public and local people were, at best, indifferent or, at worst, joined the profitable but value-destroying resource plundering if they had power, chance and access. The newly emerging logging companies abandoned SMS and turned to SL in the form of timber mining. Profit-maximizing overruled the sustainability principle. The inherent tendency of SL has always been to overlog marketable timber unless properly checked, but now this is done ever faster, ever more species are taken and ever more smaller sized trees cut, thus removing the part of the growing stock of A/B-storey species which is in the period of great volume and value growth. The common social heritage of producing capital is being liquidated

mostly for large private and partly for small fiscal gains, rather than for productive re-investment in the economy. This development is an U-turn which is incompatible with the principle of any, but particularly holistic sustainability.

This decline of sustainability in forestry and of sustainable forest management and conservation enabled the U-turn back to the customary principle of resource mining. This cultural retrogression has been possible because:

- the public forest authorities were disempowered and demoralized, their enforcement performance and confidence being weakened by the self-interested political sector and extraneous interference
- the private forestry sector, particularly the concession holders in tropical rainforest countries, had neither reason nor incentive (neither stick nor carrot) to harvest in the forest resource in the orderly manner of traditional forestry in his own interest or save productive and protective resources for the future
- there was and still is no incentive to re-invest proceeds from resource liquidation (mining of the timber growing stock) in human or natural resources of the local or national economy instead of capital export
- the highly profitable and capital-moving timber mining industry became eventually involved in financial dealings at home and abroad which promised even greater profits than timber mining and trading
- huge private profits and relatively small but easy fiscal revenues accrued from overlogging, premature re-logging and illegal logging (which, for society, kills the goose that should lay the golden eggs in future as argued in Bruenig, 1998)
- huge unaccounted private profits were and still are derived and exported from underinvoicing ("volume adjustment") and transfer pricing for manipulated and distorted domestic and export markets which are notoriously richer in money than in intelligence and sense of social responsibility
- the society at large remained and, except for few action groups, still remain indifferent to the issues largely because people feel neither personally concerned nor powerful and safe enough to act against the colluded vested interests of the political and economic power-holders
- the essentially needed confrontation and impact from action groups outside the producing countries in the 1980s was side-tracked and diverted from the real issue into campaigns against timber use and forestry generally, delaying urgently needed action by demonstrations, debates, disputes, "pilot"-trials of the already known and re-inventive research.

Politically correct and fashionable beliefs during the 1980s insisted that the tropical rainforest was too fragile as an ecosystem and too difficult to regenerate as a timber resource to be managed sustainably for timber. This is contrary to practical experience that selection harvesting in a polycyclic SMS with high diameter limits above the period of high volume and value growth and with sufficiently long felling cycles is easy to manage in temperate and tropical mixed forests on rich and average soils. A yield goal of at least 50% cabinet grade and special timber in the final fellings (excl. thinning) is apt to secure high and sustainable net stumpage values at low levels of direct costs and risks. SL with low-diameter limits and short felling cycles or monocyclic uniform systems are superior financially to SMS only if costs for

holding stock and opportunity costs for using land are charged, and high discount rates applied, this is open to argument. The currently customary SL (timber mining) is socially particularly unacceptable because the long-term effects of liquidating the value-producing growing stock capital and of the loss of site and environmental quality. The short-lived SL bonanza deprives the present generation of essential life support systems and future generations of the "golden eggs" by slaughtering the geese.

Species richness, ecosystem biodiversity, non-timber forest products

Species richness in the canopy and on the ground, and diversity of forest ecosystem structure, processes, functions and services have always and everywhere been threatened by urgent social needs and pressing demands. Diversity loses out whenever society gives priority to demands for certain natural-forest products or forest land for conversion or speculation (e.g. Dawodo and Leigh, 1897; Moloney, 1887, both in Grove, 1997, p.155-9). The social appreciation and economic value of the production function of biodiversity has declined in the course of social and economic advancement. In contrast, the crucial importance of species and ecosystem diversity for naturalistic silviculture has been more clearly recognized by foresters since the 1920 to achieve ecological self-sustainability and a high degree of self-regulation, economic adaptability and social acceptance. Species mix, structural and temporal diversity are established and crucial core concepts of naturalistic multiple-purpose silviculture in tropical and temperate forests. This concept concurs with the fundamental and crucial principle of viable sustainable forestry to operate with low levels of investments and risks, and to cope with the high level of uncertainty which is inherent in forestry.

One of the recent fashionable whims was the belief that sustainable management mainly depended on seedling regeneration and plant-pollinator interactions which were assumed to be critically precarious. Richly mixed and complex forests restock the trees in the upper canopy (A and B storeys) from the upper C-storey. The C stock is replenished by the odd chance survivor of episodic waves of seedlings in the D ground layer. Mimicking nature, the structure-control in the SMS focalizes on the A-and B- layers to favour the odd survivors and not to induce seedling regeneration. Pollen is such an attractive but erratic energy-rich food source that it would be surprising if animals were, with few exceptions (e.g. figs), monospecific in its use. Generally, high levels of species richness, habitat diversity and self-regulating self-sustainability can be maintained by canopy manipulation in tropical rainforest more easily than in temperate forests.

The essential social value of biodiversity for the society, including the evasive value of rare and extremely rare species, lies in its spiritual, emotional, sentimental and aesthetical appeal to the public. Species richness and structural forest diversity determine forest and landscape amenity, diversion capacity and, thereby, recreational value. The resonance to these in a culturally advanced society in which the basic spiritual and material needs are well supplied, is an important and relevant chain reaction: relaxation of mind => positive attitude => creative fantasy => innovative inspiration (Grossmann et al. 1997).

Sustainable forest management and forest management certification

Colonial natural scientists became concerned about environmental consequences of deforestation in the tropics in the 17th Century. Forestry scientists in Europe became seriously concerned about social and economic consequences of overuse and abuse of tropical and boreal forests at the turn of the 20th century. Later in the 20th century, campaigns of non-government action groups (NGO) disseminated information to the public in developing and developed coun-

tries of the alarming scale and consequences of deforestation and forest resource plundering. Unfortunately, some eco-dreamers concocted the unhelpful idea that boycott of tropical timber use could effectively mitigate timber mining and forest destruction. Nature, forests and native forest dwellers, it was romanticized, would lapse back into an erstwhile state of harmony if only left alone. The generalizing slogan "Baum ab, nein danke" (Tree cutting? No thanks!) became popular currency. The clear distinction between reckless SL and SMS was blurred in order to launch a discrediting campaign against tropical forestry and timber use. The "glorious history" (Wadsworth, 1997) of forestry in the tropics and the great wealth of scientific knowledge and practical experience were negated in favour of a campaign which was ecologically distorted, economically unrealistic and further disadvantaged the very people it tried to support and assist against the undisputedly negative consequences of an unbridled timber bonanza .

An international circus of cyclic conferences, workshops and re-inventive researches evolved in the 1980/90s which effectively lured the awareness of national societies and the international community away from the real, but rather sensitive socio-political issues and problems. Highly esoteric but uninformed discussions on the nature of sustainability, reinventing "new" criteria and indicators for assessing the state of sustainability, provided little new insight. However, one seemingly practicable idea came forth: a check of compliance of management with sustainability by an independent third-party could provide positive incentives and be the hoped-for panacea. This idea, unfortunately initially promoted by non-professional outsiders, is over-optimistic, ignores existing forestry procedures and, worse, economic and societal realities. The society in developing countries is strained by unfulfilled wants, notoriously ill-informed, and largely indifferent. Society in developed timber importing and producing countries, such as Germany, responds to emotionalized romantic appeals, wants to feel good and be somehow assured that forestry still is, or is again, what it used to be. But the majority of people are indifferent to esoteric and complex technicalities of certification and labelling, and antagonistic to more bureaucratic and costly regulating. Certification of forest management at management unit level in countries with well-established traditionally sustainable forestry would seem to be redundant and a superfluous, money and time consuming luxury which duplicates awkwardly and inefficiently what is already habitually done much better. Certification may be redundant from a forestry point-of-view, but it may be politically and economically beneficial and therefore feasible. Certification and labelling would be justified if they assure definite and positive marketing and public relations advantages for forest products and forestry. In developing tropical and boreal countries, with emerging forestry and rampant customary timber mining, the situation is fundamentally different. In these countries certification is urgent and essential. However, in practice in the countries with the greatest need certification faces the greatest problems:

- the local timber buying and consuming public has other and for them more pressing problems and thus is largely indifferent to the sustainability issue
- informed local populations, being sceptically suspicious of politicians and governmental schemes, may be inclined to support moves towards sustainability of forestry, but have no power to act effectively
- local indigenous-native or immigrant-native people with real or assumed customary rights are often adamantly opposed to certification of the operations of concessionnaires in forests which they claim to be their own
- the close-knit networks of colluded interests between political, commercial and other social forces in the producing country and in the distorted export markets powerfully resist any change of the status quo which may adversely affect vested privileges and profits

- the private accredited certifying body is still a selected contractor who depends on the favour of the selecting timber company, while a public certification agency is dependent on the political and governmental favours
- certification presently covers only a tiny part of the the world's forests and consequently only a tiny fraction of the internationally traded timber, while the final timber product buyer remains rather indifferent to timber labelling and its issues
- loopholes abound from primary to tertiary production levels and in the timber trade and will be used because the market abounds more in greed and money rather than in intelligence and social responsibility which works against the effective implementation of creditable certification and labelling
- the persistent and resilient distortions in the "free" market by power-holders in their own or in the national interest where greed and obsession with money prevail over intelligence and sense of social responsibility the latter of which would favour sustainability.

Forest management certification and the subsequent timber labeling respond more to group interests than to clearly perceived, rational and action-orientated concerns in the society. Whatever public concerns were and still are, they could have been easily and adequately met by the forest services if the latter had been left sufficiently equipped, empowered and politically supported. The opportunistic urge of all involved parties to appear politically or fashionably correct and reap benefits from it, creates obstructions and conflicts. The conflicts of interests, lack of true independence, contradictions of attitudes and beliefs, and the serious knowledge gaps among the promoters of certification make it very doubtful that certification and labeling will bring rapid and substantial progress and become a panacea against value-destroying forest resource plundering.

Forests and global climate change

The disastrous droughts and deadly famines in India and Australia in the second half of the 18th century led colonial scientists to suspect and investigate a possible connection between deforestation and an assumed local to global climate change towards increasing dryness. The driving force was suspected to be periodic extremes of what is now called *El Nino* Southern Oscillation (ENSO). Little was done in response to the alarms duly raised by colonial scientists who proposed among other counter-measures forest protection and afforestation (Grove, 1997). The question of whether and in which way large-scale deforestation and forest degradation affect the dynamics of ENSO and the related monsoonal patterns in South, Southeast and East Asia, and generally the global climate, especially the possibility of butterfly effects emanating from the very sensitive climatic core area of the Malesian archipelago, still eludes and baffles climatologists. The available global climate models have a spatial resolution which is too coarse to give an answer to this question (MPI, 4.8.98). The difficulties of short-term and long-term forecasting of trends and changes in the complex and dynamic climate, forestry and socio-political systems have much in common. Uncertainties, effective episodic events and erratic behaviour are common to all three types of ecosystems. Reliability and value of forecasts in all three ecosystems may be increased if major areas and components of particular sensitivity and functional momentum can be identified and emphasized in modelling.

The phenomenon of carbon fixing, cycling and release by forested and deforested lands is less elusive. The results of three decades of research by SCOPE (Dale et al., 1991; Woodwell et al. 1983) and many individual research groups (e.g. Crutzen and Andreae, 1990; So-

embroek et al., 1993) provide a fairly clear picture of the kinds, quantities and qualities of stocks and flows of carbon compounds, and their relation to other mostly man-made flows and stocks. The conclusion is that forest management has hardly any effect on global stocks and flows. Even tropical deforestation for agriculture contributes only a a fraction of the emissions from other man-made sources (Unesco, 1978). The subsequent cultivation, if well managed, or secondary natural succession will reduce net emission rates by fixing carbon in the plants and soil organic matter (SOM). The recent popular whim-inspired proposals for carbon sequestration in forestry must be seen primarily as marketing stratagem of the fossil-fuel burning industry and the connected political sector to avoid the consequences of effective reduction of carbon emission. Proposals in forestry are to restore orderly timber harvesting procedures (termed "reduced impact logging", RIL), to reduce of wastage in logging and manufacturing, to regenerate by afforestation, reforestation and enrichment planting. There is nothing in the proposals which goes beyond proven procedures of traditional forestry, except for the new and exotic suggestion to mine the timber first and then close the area as totally protected area (TPA) to let carbon be fixed and biodiversity be increased, marketing both for a profit. Whatever the feasibility of these proposals may be, the present scope of carbon-sequestering activities under various programmes involving forestry is tiny in comparison to the scale of release by rainforest decline, growing stock depletion and forest and soil degradation (erosion and SOM mineralization), but substantial in terms of R&D funding and carbon release benefits. Substantial and effective long-term carbon fixing by forestry would require additional planting areas, new funds and management skills of such utopian proportions that it is neither feasible nor practicable.

Sustainable natural rainforest ecosystem management and protection: utopian dream or realistic possibility?

Intensive campaigning by suburbanite eco-theoreticians in the 1980s has made the public to believe that forestry in tropical rainforests invariably means:

- that resource-value destroying SL and forest over-use are essential and inherent features of forest ustilization and intrinsic even to economically viable sustainability-orientated forest management, blurring the crucial distinction between exploitative SL (capital-liquidating timber mining or overlogging) and silviculture-integrated selection harvesting in an SMS
- any rainforest management system for production will immediately or after two or three felling cycles unavoidably deplete the growing stock, degrade its genetic value and destroy the viability, complexity and diversity of the assumedly fragile rainforest ecosystem which is habitually prone to causing cascades of catastrophe until its final collapse
- pristine (i.e. physically or economically inaccessible and therefore untouched forests or legally gazetted or management plan prescribed TPAs) and man-modified forms (overused, overlogged, properly harvested) of natural rainforest cannot be sustainably managed because of their intrinsic fragility and the lack of scientific knowledge
- sustainability of rainforest management, consequently, is a forester's utopian dream and a pretension which misleads the public
- stopping of all logging and production-management activities in rainforest is therefore crucial and an absolute necessity if the rainforest ecosystem should survive
- in the case of tropical rainforest, survival is best assured by boycotting tropical forest produce, especially timber

- that forestry plantation must be established, assuming that the production capacity in terms of volume, grade and value of plantations would be adequate to meet demands in future, thereby taking logging (not conversion) pressure off the natural forest area, which is a somewhat naive hope.

In reality, tropical rainforests are robust, elastic and resilient exactly because of their organizational, structural and taxonomic diversity and complexity, reducing risk by what seems to be, but actually is not redundancy. The great capacity to buffer impacts, such as climatic damage or SL in SMS, and to shift processes vicariously to other functional units or species in the redundancy-rich system forestalls any trends towards cascading into collapse. Contrary to common belief, tropical rainforests ecosystems as a result are easy to manage with common sense and ecosystem-compatible attitude, if the spatial and functional nature and the dynamics of the particular forest ecosystem are empirically understood and cautiously assessed by experience, holistic intuition and dynamic imagination (Diagram.1) in order to choose the option which is most likely to be the least wrong. Naturalistic low-investment low-risk management is much easier in tropical rainforest ecosystems than for example in mature-phase single-species climatic climax beech forests in Germany which are ecological deserts, ecologically and economically inflexible and fragile, and depend on the success or failure to regenerate and nurture the one tree species, beech, only. However, overuse and especially reckless timber mining in tropical rainforests depletes beyond easy repair resource values and viability in terms of economic, environmental and social functions and services with potentially serious consequences to the society. The devastating results of combined effects of reckless overlogging, careless plantation establishment, slash-and-burn agriculture and ENSO-extremes of drought in the Malesian Archipelago are due to human misdemeanour and not evidence of rainforest fragility.

SUCCESS IN ECOSYSTEM MANAGEMENT COMES MAINLY FROM

Intuition

Imagination

Sceptical Optimism

Self-Critical Confidence

Ample Practical Experience

Rational Asprirations and Expectations

Adaptability, Elasticity, but Persistence of Purpose

Maintenance of High Standards of Motives, Ethics and Morals

Diagram. 1. In sustainable forestry and forest management, the ecosystem management approach requires a sound footing on scientific ecological knowledge but the very nature of complex, dynamic and diverse natural ecosystems defies any aim to achieve “complete knowledge and understanding”. Developing strategies and tactics of sustainable management by assembling pieces of knowledge on processes, structures and functions with the hope to obtain a sustainable and lastingly feasible system is futile. The holistically conceived management of fuzzy and constantly changing natural and cultural ecosystems requires human attitudes and capabilities which lie beyond purely mechanistic technological knowledge and approaches.

If has been suggested that to mitigate rainforest resource depletion either carry out total protection (TPA) of all pristine and modified rainforests, or alternatively to overlog the forests (liquidate the growing stock) first, thereby making them commercially unattractive, and then lock the areas up as legally gazetted TPAs. Both suggestions are unrealistic and would amplify the ongoing bonanza which is already socially unacceptable and economically undesirable, without ensuring protection of the large TPA against future encroachment. More realistic, feasible and rational are strategies to integrate all forms of forest production and protection in formal and legally binding plans at regional, landscape and management unit levels. This approach has proved its worth in Europe and has been empirically tested with success in some instances in the rainforest biome in the past. More recently, the concept of this strategy has been revived in the tropics, for example in the Bufferzone concept of IUCN and the Biosphere and MAB programmes of Unesco (Bruenig, 1998).

Low-diversity no-redundancy plantations of fast-growing species with short-rotations are high-cost and high-risk investments which are only viable if they form part of an integrated short- to medium-term industrial project. Their poor ecological, economic and social adaptability, narrow range of not very valuable products, susceptibility to pests, diseases, fire and eventual growth decline, except on exceptionally favourable soils and sites, and the consequently high dependence on intensive management make their prospect of success much more uncertain than in the multiple-use management of diverse natural forests. Plantations are justified not as an alternative but only as carefully and site-specifically planned supplement to the management of natural forest. Natural mixed and diverse forests and simple plantations have utterly different self-regulating and self-sustainability capabilities. In forestry, they serve different goals, production targets and environmental functions. Plantations, especially intensively managed forestry and agricultural tree and palm plantations, may even be environmentally detrimental by their emissions of chemical compounds into the atmosphere and hydrosphere.

Environmental and ecological risks at landscape ecosystem level increase if genetically modified “improved” trees, in terms of superior growth and yield, are introduced to plantations. The possibility cannot be refuted that genes are exchanged with the native flora via pollen or viruses, perhaps even enter the fauna, with unpredictable ecological effects. This conflicts with plantation forestry strategies which essentially include effective risk avoidance and risk reduction to improve chances of achieving ecological and economical viability. Risk avaoidance and reduction are crucial for economical viability and profitability and more crucial for success than procedures of narrowly maximizing increment and yield while the uncertainties are high. The current trend of genetic modification does not create assessable new risks, but additional and non-assessable uncertainties, which according to the precautionary principle should be avoided. In order to make plantation forestry socially acceptable and socially sustainable plantation development must be integral components of holistically designed national and regional (landscape ecosystem or economic-social region) development and forest management plans (ITTO, 1992).

THE MAJOR OBSTACLES TO SUSTAINABILITY OF FORESTRY AND SUSTAINABLE FOREST MANAGEMENT

Human behaviour and its underlying gender-specific motives and capabilities are deeply rooted in our biological evolution (Markl, 1986; Moir, 1998). Our cultural evolution has succeeded to cover and constrain our scavenger-predator instincts with a thin veneer rather ineffectively. The story of tropical rainforest destruction and depletion illustrates how easily indivi-

duals, communities and societies burst through the thin veneer with devastating results. If individual and corporate motives for prestige, power, persistence (heritage) and material gain from resource plundering are strong enough to burst through the veneer, social conflicts arise from the resulting inequities. Preventing this and effectively avoiding or solving these conflicts determines whether sustainability of forestry and sustainable forest management and protection are realistic possibilities. Both will remain a fanciful utopia as long as the inequity-caused conflicts between the various social sectors persist. The link between profiteers reaping huge profits from forest capital liquidation and forest land speculation and political power-holders secures the status quo for the privileged. As awareness of deprivation, inequities and environmental threats increases among those who do not benefit but lose their life support systems and resources for the future, problem pressure on the profiteers and power-holders increases. Eventually the political sector and its bureaucracy and cronies are forced to act even against individual and corporate vested interests (Fig.1 and 2).

A major obstacle for effective action is the notorious human intellectual failure to comprehend, or self-centered unwillingness to appreciate the nature of the forest, environmental, economic, societal and political systems as complex, dynamic and interactive systems in which the only constant is change. Change in pristine forest ecosystems includes phasic and cyclic declines and episodic catastrophes which are “acts of God”, and train the system in survival. In exploited or managed forests decline and catastrophe are mostly due to human greed, folly and incompetence to cope with complex dynamic situations effectively and to handle unpredictably changing complex dynamic systems in a manner consistent with the dynamic cultural principle of sustainability. A fuzzy strategy of approximation, traditionally implicit in naturalistic single-tree silvicultural management by continuous control and monitoring, e.g. control method in Plenterwald and Teak forests, would be the most promising, low-risk, low-cost strategy, but is not yet popular. This strategy requires a degree of spatial and dynamic, “multi-dimensional” ecosystem thinking which is still very rare even among ecosystem managers. Many foresters are still not really free of the positivistic simple-linear thinking behind the normal forest dogma and deterministic yield-table model concept of the 19th century.

These is little knowledge of ecology and forestry among the public and their understanding of ecosystem properties is almost absent while myths abound especially with respect to tropical rainforests and their peoples. There is a certain unwillingness to bridge the knowledge gap and abandon inherited or newly developed myths if they serve self-interests. This unwillingness to change cherished or profitable positions and attitudes, and generally to defend the *status quo* is naturally greater among priviledged members of the economic, financial and political complex of colluded interests. This persistence seems to contradict the fickleness of fashionable attitudes and the unpredictable, often erratic variability of public and political preferences and value perceptions. The contradiction disappears if the differences in self interest and in the strength and kind of motivation are considered. Past and contemporary criteria and processes of selecting for position of power in society work against people with social responsibility, tolerance, compassion and holistic thinking. Raw instincts, strong primeval motivations, tough elbows, narrow focus, linear thinking are more essential for success in politics, economics and financial speculation than intellectual sophistication, ethical sensitivity, moral behaviour, integrity and ecosystem thinking. Successful profiteers and power-holders consequently are rarely suitable, but often dangerously unsuitable for handling complex dynamic situations and complex dynamic natural or cultural ecosystems if sustainability and the common good are at stake. This is one of the reasons why the tropical forest product market and markets generally are poorly if at all equipped with effective self-regulating mechanisms

which could be used to promote sustainability at the source. The current economic, financial, social and political crises in East and Southeast Asia and Russia and the fire scenario in Indonesia express the wilful, inherent ineptitude for sustainable ecosystemic management of the financial and political power-holders and the force of links to organized crime. The confusion, helplessness, greed and callousness displayed by the political, economic and financial establishment illustrate how far we are from bridging the knowledge gap, restoring ethical and moral standards and enforcing rational, holistic strategies of sustainability-orientated ecosystem management.

Finally, an important and independent variable in the complex of impacts, obstacles and obstructions is the time factor. The evolution of the social phenomenon of sustainability in European forestry spanned more than a millennium and still continues. The transition from habitual timber mining to sustainable management and utilization in tropical rainforests will certainly need more than the one decade set by the ITTO Target 2000. A recent, 1996 to mid-1998, pilot project of the Indonesian Ecolabeling Agency assessed the degree of sustainability of 70 timber logging companies in Indonesia. Of these 70, only 26 were "adequately prepared", but not a single one was "fully prepared" to meet ecolabelling requirements (Jakarta Post, 14.5.98). By 1998, of all rainforest countries only three, including Malaysia, can be regarded as being truely and seriously on the road towards sustainable forestry and sustainable forest management.

CONCLUSION: NOT THE TROPICAL RAINFOREST ECOSYSTEM, BUT SUSTAINABILITY IS FRAGILE

The major obstacles to introducing or restoring the principle of holistic sustainability lie in the human nature. Therefore, the major problem-causing factors lie in the social (political, economic, financial) power structure. The hope of successful action towards restoration of the principle of holistically perceived sustainability of forest resource use and protection in the rainforest biome hinges on the success of reshaping ethical attitudes and moral behaviour. Further, it depends on the strength and commitment of public support (Fig.1 and 2). The traditional concept and practice of social forestry shows the various ways to involve the directly affected local population and the general public in the processes of sustainable forestry. Without society's acceptance and active support there will be no sustainability at any level of forestry. The evolution of sustainable social forestry in Central Europe from the beginning included communal forestry in forests owned by the various forms of private or public communities. It also included what Balsa and Carter (1998) termed "collaborative forestry". Collaborative forestry involves all relevant social sectors and institutional bodies in the formulation of forest policies and management strategies. In Central Europe collaboration is obligatory and institutionalized at the levels of national and regional development planning. At local and forest management unit planning the mechanisms are different and differ according to local conditions. Informal and formal access to credible information and continuous consultation are more effective and practicable than institutionalized direct participation by "stake-holders" who do not have concrete stakes and seldom the necessary qualifications in forestry and forest management and conservation. Practicable forms of collaboration are likely to benefit the knowledge pool and create mutual understanding and tolerance. Consequently, there will be less cause for social friction and conflicts can be solved before they become problems. Forest management would benefit in the long-term by streamlining management procedures as much and far as possible to fit society's aspirations, however constantly changing these may be, and by avoiding management complications and the direct and indirect costs and risks which arise from conflicts.

Collaboration and consultation raises the question of formulating national, regional and local goals for the various forest functions. Decisions at all levels require consensus by compromise among the involved parties if conflicts are to be avoided. At forest management unit (FMU) level the primary goal is and will remain the production of timber. In natural forest management this timber will be in future more than at present high-quality cabinet and speciality timber grades. Other timber grades, particularly medium quality general purpose timber which have to compete with plantation timber, and non-timber forest products (NTFP) will be decidedly supplementary, but not the primary product. Rising standards of living, appreciation of quality and solidity, and increase of population, particularly urban dwellers, will assure continued and increasing demand for high quality and speciality timbers. Suggestions to promote presently less used timber-tree species should therefore viewed with caution. Their future value as speciality timber and diversity component may be much greater than their present market value. The conclusion for natural forest management is that a nature-mimicking (not copying) ecosystem management approach in some form of SMS has the greatest chance to be the least wrong ecologically, economically and socially (Bruenig, 1998).

The principles of holistic sustainability of forestry and sustainable forest ecosystem management impose constraints on the freedom of individuals, communities and corporations to use common resources such as land and forests. If this is accepted by the society as a whole, or by a democratic majority of the people, the still valid dictum "forests precede a population, and deserts follow it" (Schleiden, 1848, in Grove, 1997, p. 157) may be invalidated and a reversal initiated. However, the present state of the rainforest dilemma still vindicates Professor H. G. Champion's sceptically pessimistic but obviously realistic statement in a reply to a student's question in a 1951 seminar at Oxford: "Sustainability of management and conservation of the tropical forests will only be realized after so much forest is depleted and destroyed that the people feel the pain and suffer so much that action is enforced, as it happened before in Europe". The young and optimistic student did not like this scepticism at all, but since has learned how right the "old man" was. Solutions can only be found in a holistic manner, based on facts and not on utopian dreams, except that non-utopian dreams may guide. So far international and national activities have not yet freed themselves of the dominating influences of vested interests in the economic-financial-political complex. Actions towards sustainability have been more cosmetic than effective. The rainforests are still seriously endangered by rampant overuse and abuse of the forest and misuse of the land. Sustainability of forestry is still a distant and fragile hope in most parts of the world and in all types of forests.

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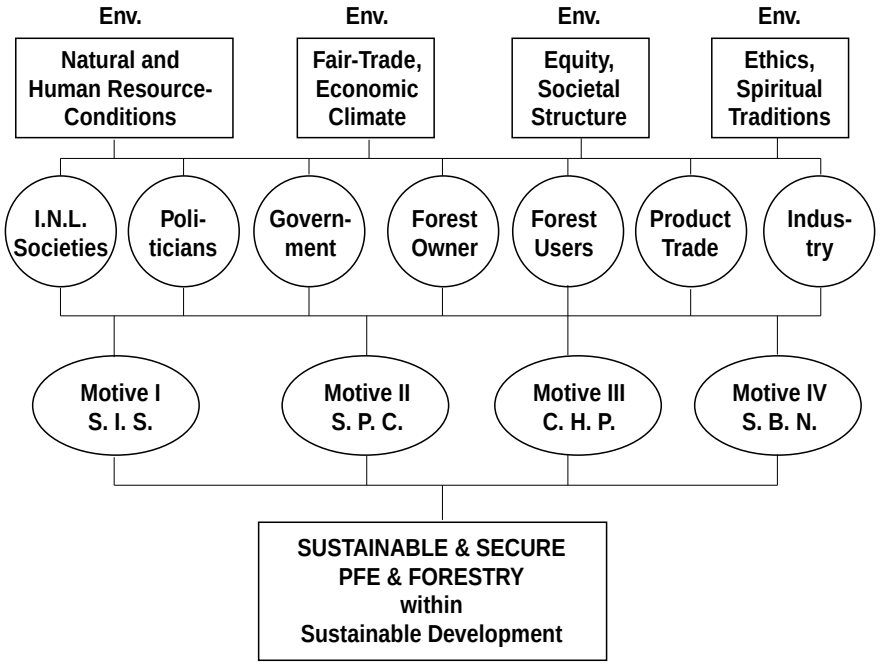

Fig. 1. The natural and cultural environmental (Env.) systems, the social sectors and the common basic human motives jointly determine the course between: (1) misuse (speculation, misappropriation, capital flight and money syphoning), abuse (damage and wastage, forest and human resource neglect) and overuse (over-logging, re-entry) or (2) sustainable forest conservation and management and sustainable socio-economic development in an emerging forestry in a tropical or temperate country.

Motive I : Social integration, "feel good" sentiment; or by flip-flopping social drop-out

Motive II: Excelling in society, power and crime to control and use resources; or economic drop- out

Motive III: Preserving personal or public, physical or spiritual common heritage; or drop-it attitude

Motive IV: Securing private freedom, life-support base and human rights, or "Nanny State" attitude

I.N.L.: International, National, Local levels of society as scenes of action

PFE: Permanent Forest Estate, including Totally Protected Areas (TPA) of all kinds

The rate of flow and the quality of either positive or negative impacts of the (+) or (-) feed-back loops (indicated by simple connecting lines without arrow or symbol) in the whole system on the state and functions of forests determine the state of sustainability of forest management and conservation within forest management-units and of forestry at regional forest management planning (RMP) and at regional and national levels of planning social and economic development and environment, nature and species conservation.

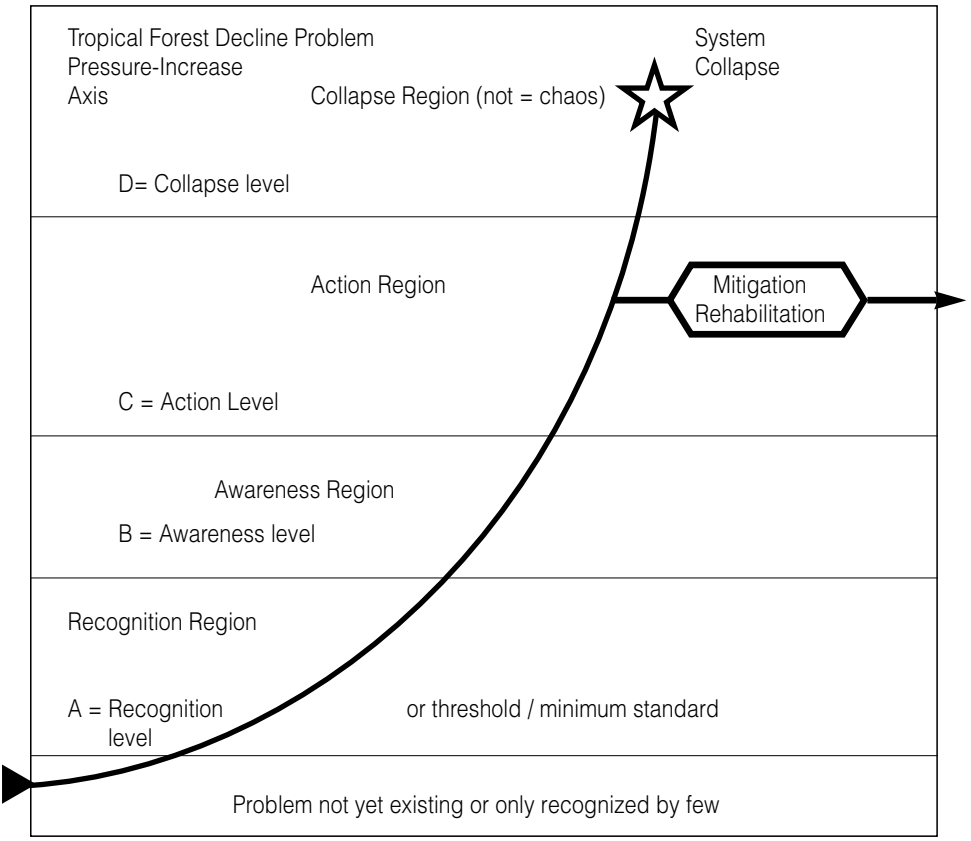

Fig. 2. Forest resource decline and destruction create a problem pressure on the public which response by eventually forcing the political sector to act.

D: If no action had been taken in C, overuse, underutilization, abuse and misuse continue to point of collapse of the natural forest- landscape and cultural socio-economic ecosystem complex, while possibly catastrophic it is not synonymous collapse into chaos.

C. Severity of problem pressure, NGO pressure, activities of the international scientific community and demands of the general public finally force the political sector to implement mitigating action; otherwise, decline progresses into the collapse region D.

B: Emerging actions by citizen groups and NGOs on believes or information; scientific information creates general awareness and concern, but the political sector circumvents problems by conferences, committees and research funding to avoid decision and action.

A: Early warnings by scientists and conservation-minded people are not heeded by society.