

RURAL DEVELOPMENT FORESTRY NETWORK

Pursuing the 'D' in Integrated Conservation and Development Projects (ICADPs): Issues and Challenges for Papua New Guinea

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About the Author

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Introduction

This paper reports on the challenges to establishing a representative system of protected areas in Papua New Guinea (PNG) using development as a conservation tool. In doing so, it assesses the issues that must be taken on board within PNG in implementing integrated conservation and development projects (ICADPs). The country's rich biodiversity endowment faces a number of long-term threats from industrial logging, land use conversion to permanent agriculture and unsustainable subsistence farming. The monetisation of hitherto subsistence economies is leading forest-edge communities to meet their new cash and basic service demands by degrading the environment. Unless the conflicts between new socio-economic imperatives and conservation needs can be reconciled, the long-term prognosis for PNG's biodiversity is poor.

ICADPs aim to protect biodiversity by providing local communities with tangible incentives for conservation management. They differ from integrated rural development projects (IRDPs) by emphasising biodiversity conservation and environmental maintenance, with development pursued as a means to an end rather than an end in itself. This need to control human use of ecosystems in the development process makes ICADPs more complicated and risky than traditional IRDPs.

The PNG Department of Environment and Conservation (DEC), with financial and technical assistance from the United Nations Development Program/Global Environment Facility (UNDP/GEF), is looking to define the features of successful ICADPs in the local setting. The two agencies have collaborated to found the PNG Biodiversity Conservation and Resource Management Program (hereafter referred

to as the Biodiversity Program). An important mandate of the Biodiversity Program is to establish two new conservation areas using integrated conservation and development (ICAD) methods, and by so doing produce a replicable model for protected area establishment and management. A number of non-governmental organisations (NGOs), working closely with local communities, are also searching for ICAD-type solutions to the emerging conservation crisis.

The paper begins by assessing the current threats to biodiversity and explains why, if biodiversity is to be safeguarded in the long-term, ICAD-type initiatives are so essential. A review of the ecological, economic and social challenges to successfully pursuing the 'D' or development component of ICADPs in PNG is then made. 'Development', for the purposes of the paper, is interpreted as being synonymous with income generation, reflecting its popular interpretation in PNG to mean access to goods and services. Such a narrow perception was first promoted by colonial authorities and perpetuated by successive government administrations, and has led to an emphasis on 'delivery' rather than wider social and environmental goals.

PNG ranks as one of the most culturally diverse countries on earth, with 750 plus languages (in seven language groups) spoken by some 10,000 traditionally autonomous political communities (Wurm & Hattori, 1991). This great social diversity makes it difficult to generalise for the country as a whole, but there are a number of basic similarities between communities. These include development expectations; the impact of demographic and technological change on subsistence practices; and the extensive penetration of Christianity and cultural mores from the outside world, leading to a loss of traditional values. Many of these factors have negative implications for conservation.

The PNG Situation

PNG ranks as a middle income country with a per capita income of some US\$ 820 per capita, although it has been estimated that four-fifths of the population has a per capita income of only US\$ 350 (World Bank, 1994). Life expectancy at birth is less than 55 and the under-six mortality rate is 80 per 1,000 live births. In general, the quality and quantity of health and education services in many rural areas is very poor, resulting for example in an adult female literacy rate of 38% (UNDP, 1993/1994).

In terms of its biology, PNG boasts a great diversity: it is thought to contain 5% of the world's biodiversity in only 1% of its land area (Miller in Sekhran & Miller, 1995). There are up to 20,000 species of vascular plants, and 2,000 species each of ferns and orchids (Johns, 1993). Forest types include diverse mangrove systems, swamp forest, lowland, hill and montane forests, and alpine habitats on the higher peaks. PNG is also a centre of distribution for coral reef species. Island endemism is considerable, with many species having highly restricted ranges.

PNG's forests cover some 70% of the country (about 320,000 km²), representing one of the highest per capita forest endowments in the developing world (at about 7.8 ha per person). These resources have formed the basis of human subsistence over the millennia, and continue to provide essential economic and environmental services to the economy.

PNG's forests are currently threatened by conversion for agriculture, logging, mining, dynamite fishing and other activities. Demographic growth rates for the country as a whole are 2.3%, with the population expected to reach 6.6 million by the year 2015 (1990 Census NSO). As the population becomes more youthful, with younger generations alienated from traditional culture and oblivious to past natural resource management practices, and harbouring high 'development' expectations, current threats to biodiversity will clearly be exacerbated.

Resource owners have traditionally held strong cultural, spiritual and subsistence attachments to natural resources. However, PNG's traditional societies were not conservationist *per se*, but rather were noted for their manipulation of natural resources to meet their subsistence needs (Bulmer, 1982). Conservation historically was a product of circumstance rather than intention, and occurred because population densities were low and technologies simple (ibid).

Forest-edge communities' relations with their environment were to a large extent dictated by traditional religion, sorcery and superstition. Spiritual practices generally aimed to protect human welfare; for example prohibitions (*tambus*) on forest use were inspired by the need to assuage forest spirits (*masalai*). While these have been interpreted as examples of active conservation management, any conservation benefits are likely to have been incidental (ibid).

However, in contemporary PNG, many rural communities no longer regard themselves to be controlled by the natural environment, but rather, perceive that

natural resources may be dominated and sacrificed for personal gain (Warakai, 1995). The penetration of Christianity has caused traditional religions and the associated conservation-friendly practices to be discarded. Though there have been calls in recent years by prominent (mostly urban) Papua New Guineans for a return to traditional lifestyles, it is doubtful whether this will have much effect, in view of the new found development expectations of forest-edge communities.

The Root Cause of Biodiversity Threats: Conflict Between Development and Conservation

Most of the costs (including the opportunity costs) of conservation, particularly in developing countries, are borne by forest-edge communities, while the benefits accrue mainly to global communities and future generations (Wells *et al.*, 1992). This imbalance between costs and benefits often causes communities at the forest-edge to opt for other forms of land use.

PNG, together with other Melanesian countries, is unusual in that 97% of the land is owned by traditional resource owners. In general, land is held collectively by kinship groups rather than individuals, though use rights are assigned to individuals. Such a property rights regime should induce sound stewardship of natural resources, but in practice this is not proving to be the case. Many resource owners are committing their forest resources to ecologically destructive uses, and despite security of tenure, achieving community-based conservation is proving difficult.

One reason for this is the transformation of the standard-of-living expectations and consumption patterns of resource owners, who lack the skills, experience and information needed for sustainable development and viable income generation. This leads many to sell their natural (particularly forest and mineral) resources to developers who bid for use rights by 'promising' social and economic progress (see Filer, 1995a/b).

Resource developers, particularly in the timber industry, pursue rent-seeking opportunities and generally have few incentives, except for poorly enforced regulations, to seek ecological sustainability. Agreements with resource owners about use-rights are too often exploitative. Communities rarely capture more than a fraction of the real net value of the resource being extracted, and infrastructure provided by the developer under harvest agreements is seldom durable.

Nevertheless, what may seem like a small amount to outsiders, may appear large to, or indeed overwhelm, resource owners with little experience of the cash economy. Few resource owners comprehend the real money value of their natural resources (though there are notable exceptions to this).

One reason why developers have been so successful in persuading communities to enter into harvest agreements is because they have established wide systems of patronage, which have accorded them a substantial power base. This is especially so at the local level, where deals have been struck with 'big men' within communities.

The task of achieving conservation is complicated by a concert of interests between the welfare objectives of resource owners, the profit-seeking behaviour of developers and the revenue maximisation objectives of the State. The PNG Government has traditionally depended on tax flows from the mining sector to service its revenue needs. However, in recent years, the share of aggregate income captured from the forestry sector has increased from 1.67% in 1989 to 12.67% in 1994 (internal IRC data), as a result of policies to increase the scale and number of logging operations. The State captures some 33% of gross logging revenues at current prices.

The Conservation Challenge

The problems described, coupled with a limited capacity to establish and manage protected areas, have led to a conservation impasse. Some 13,000 km² (2.8% of the land area) of PNG have designated Protected Area status. The protected area network comprises four national parks on State land, four provincial parks and 26 wildlife management areas on customary land. The Wildlife Management Area concept aims to delimit land on which the use of fauna for both subsistence and commercial purposes can be controlled. Legally, however, there is no basis for precluding exploitative development in these areas (Cathy Whimp, legal adviser, DEC, pers comm.).

Most areas within the protected area system are too small to serve as viable repositories of biodiversity. Though the overwhelming majority of protected areas are on customary land, there are few incentives for resource owners to conserve them. In fact, pressures are being placed on the DEC to remove protected area

classification for some areas (eg. the Garu Wildlife Management Area in West New Britain province). Virtually all sites have been subjected to some degree of degradation, and none of the areas has an active conservation management framework. An additional problem is that the current network is not representative of PNG's habitats (WWF & DEC, 1993). Consequently there is a need both to reduce threats to existing protected areas and to expand the protected area network.

Underlying the ICAD approach, and distinguishing it from previous endeavours, is the belief that unless resource holders perceive conservation to be in their interests, stable conservation cannot be achieved. The challenge is to establish a nexus between the interests of resource custodians and the objectives of conservation management. The hypothesis is that this may be achieved by improving the welfare of resource holders through the promotion of ecologically sustainable social and economic development in a context of rapidly evolving development expectations. It will be necessary to demonstrate that specific ecosystems, and the fauna and flora they contain, have tangible economic values that can be *sustainably* utilised to generate productive values for local resource owners. Such values will need to be comparable, over the medium term, to the income available immediately from alternative development. A list of the current ICADPs, together with basic information on forest type, levels of and types of threats, and potential development opportunities is given in Appendix 1.

The Issues – the Ecological, Economic and Social Dimensions of ICADPs in PNG

Income-generating opportunities for ICADPs can be separated into four broad categories: the *in situ* exploitation of forest products; ecotourism and other uses of ecological products and services (such as the payment of access fees for research); commercial agricultural development and support to improve food crop production in the forest margins; and emerging markets for ecological services (such as carbon sequestration). The following sections consider the ecological, economic and social factors which will affect ICADPs and the success of development initiatives, both in terms of conservation outcomes and long-term economic viability.

Ecological Dimensions

It is well known that the complexity of tropical ecosystems has profound consequences for sustainable resource management. The problem is that knowledge

of specific ecological determinants in PNG's forests is generally scant. In particular, there is a dearth of information on species' survival needs and how linkages between flora and fauna within the forest environment operate. For example, for many floristic resources, data are lacking on fruiting and flowering phenology, growth, yield, reproductive capacity and symbiotic associations with other species. Though information can be gleaned from local people, there has been little effort to record this fast-disappearing knowledge.

In PNG, timber production represents the most important forest use value. A number of ICAD initiatives are considering experimenting with reduced impact logging techniques. These utilise low impact harvesting methods, and attempt to maximise value-added at the community level. A current 'knowledge gap' regarding the regenerative capacity of PNG's forests after selective use hampers management and is a constraint to the development of a local 'eco-timber' industry. While a number of studies have established the impacts of various silvicultural regimes on forest regeneration, many have been oriented towards sustaining logging yields, rather than ecological processes – two very different things.

A wide array of forest products could conceivably be exploited for income generation. Many of these are currently harvested by forest-edge communities for their own consumption. These include rattan, used for home construction and household implements; sago, an important food source in swampy areas; and a wide variety of fungi, fruits and vegetables. Timber and handicrafts enter the overseas market, while a number of wild-harvested food products are traded domestically. Certain exudates and essential oils also have market potential.

Extraction of these products has ecological consequences that need to be taken into account. Strangler Figs (an important fruit source for frugivores) grow on a number of commercially important rain forest tree species. The loss of these 'host' species could have unforeseen long-term impacts.

Another issue concerns the extent to which 'development' assists the colonisation of exotic species such as the ubiquitous Cane Toad (*Bufo marinus*), African Giant Snail (*Achatina fulica*) and domestic cat (*Felis catus*), which threaten native fauna and flora. This is known to be a problem with industrial logging, which opens up corridors for colonisation. The extent to which it is likely to be associated with non-timber forest product (NTFP) extraction and reduced impact logging is unknown.

Another issue for concern is the potential conflict between ecological and financial viability. For any NTFP, the volume that must be harvested to ensure the financial viability of a burgeoning number of forest product enterprises, may exceed levels that are ecologically sustainable. Over-exploitation has happened with rattans, edible swiftlet nests and other wildlife products in parts of South-East Asia (De Beer & McDermott, 1989).

A further issue is whether resources should be managed for ecological or economic ends. Desirable species may, for example, be relatively rare, so that sufficient supplies of the product cannot be ensured. This is particularly likely to be true in climax forest (Peters, 1994). While silvicultural interventions could enable more intensive harvesting and reduce the pressure on remaining forest stands, they could also carry hidden ecological costs.

Two important considerations when deliberating the ecological dimensions of ICADPs are: what is an appropriate level of risk? and can risk levels be managed? Ecological risks associated with ICADPs need to be assessed relative to the risk to biodiversity of allowing the current situation to continue without active conservation interventions. A paramount difficulty is in reconciling ecological and socio-economic priorities, and knowing what weight to give each in the event of conflicts of objectives.

According to the Theory of Island Biogeography (MacArthur & Wilson, 1967), smaller habitat pockets sustain less biodiversity. The implication is that conservation areas have to be large if they are to serve a conservation purpose. For PNG, Beehler (1993) argues that a protected area should consist of at least 8,000 km² of wilderness. In addition ICADPs ideally require a 'development impact zone' of indeterminate area. The difficulties of accessing such large areas of land in PNG for conservation are immense.

A given area of land with conservation interest is likely to encompass a multitude of resource owner groups. A system of zoning, to allow for multiple land-use planning and management, will be essential in conservation areas. This would include improving the management of already modified habitats, as the intensity and efficiency of their use influences the rate of conversion of virgin areas. This is illustrated by the case of shifting agriculture in PNG. The productivity of gardens typically tapers off after a short period, causing cultivators to cycle through land

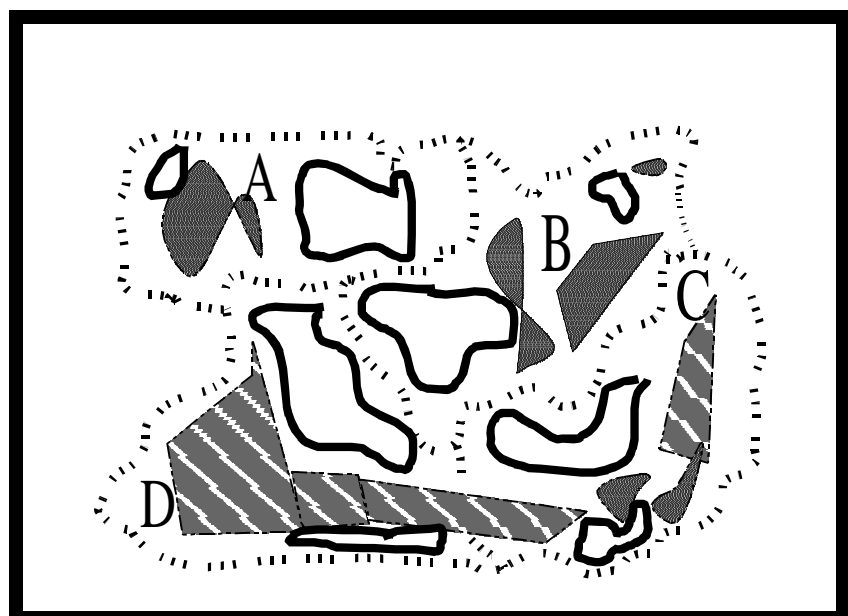
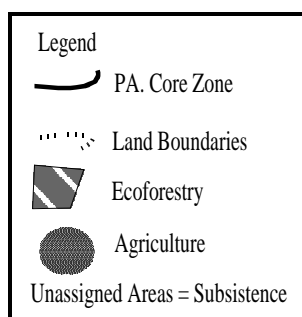
that has been allowed to lie fallow (Allen, 1993). Demographic growth is placing pressure on the availability of fallow land (usually covered by secondary forest), forcing people to clear virgin forest.

Within a zoned conservation area, it would be important to establish a core zone, or minimum-impact area. This would serve as a repository of species, safeguarding vital gene pools. Core zones will involve an opportunity cost for resource owners in terms of foregone subsistence and income opportunities. Before dedicating their resources to core areas, resource owner groups will want assurances that the tangible benefits that accrue to *them* outweigh the costs. Incentives may be needed to convince them to set aside their land as part of the core zone.

In practice, each stakeholder group will almost certainly seek to allocate most of their land to the zone of extraction – apportioning only a part of it for strict protection. The end result will be a fragmentation of core areas. This situation is shown diagrammatically in Figure 1.

The figure depicts a hypothetical protected area with four large resource owner units, A, B, C, and D. Each group seeks to maximise development opportunities on their land in the form of ecoforestry and/or agriculture, the two development options available. Each group also sets aside a portion of their estate for strict protection (the core zone), but this fragments the core area and so biodiversity objectives are not achieved.

Figure 1:
Protected Area I

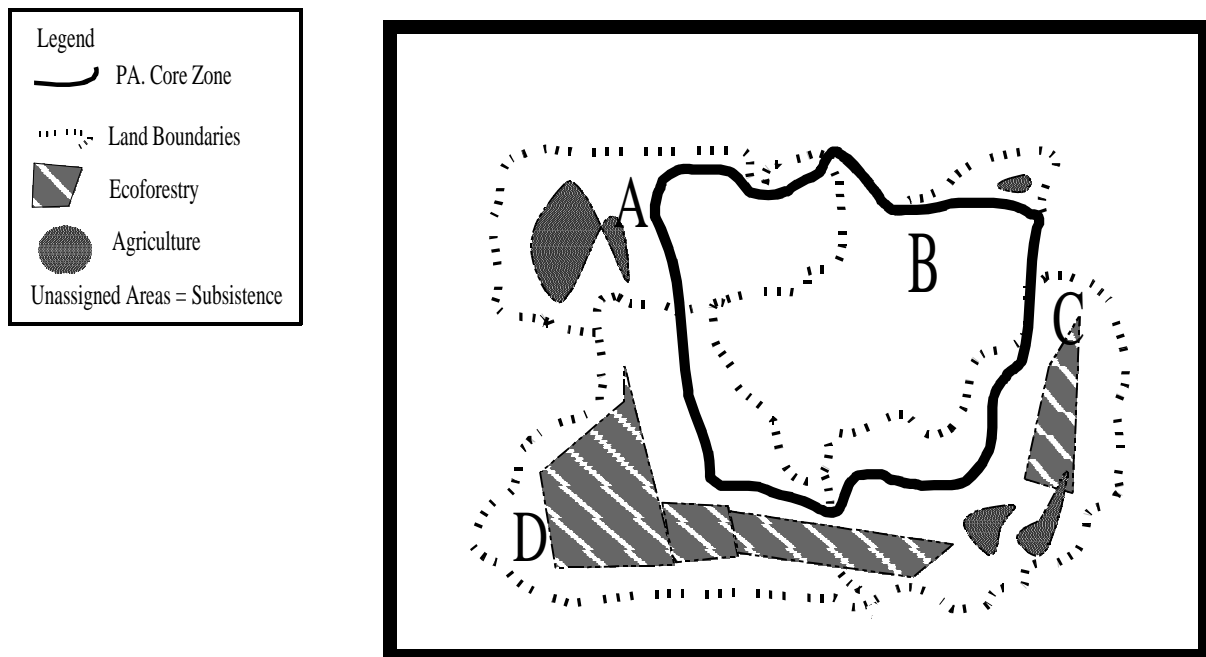


This is the prevailing situation in the Crater Mountain ICADP in the Eastern Highlands Province. Kinship groups have prohibited hunting and extraction of wildlife on portions of their land: this has reduced some of the adverse impacts of subsistence practices on flora and fauna. While intervening (non-designated) areas are currently forested, there is no guarantee that this situation will prevail in the future.

In view of the need for large conservation or minimum-impact areas, the core zones of different resource owner units should be contiguous. However, in practice this will be difficult. For example, the proposed Lak Conservation Area, encompassing a total area of 100,000 hectares, contains more than 50 resource owner groups. The multiplicity of interests between these groups makes the task of stakeholder negotiation very complex.

An alternative approach is to incorporate entire land holdings into large core zones, and ensure that these groups are compensated by benefits from development that occurs in extraction zones elsewhere in the protected area. To do this, a transfer mechanism is needed. In Figure 2, almost all the land of community B is incorporated into the core zone, leaving little room for development on the holding. Extraction takes place in areas A, D and C. Clearly group B is unlikely to agree to this arrangement unless they capture a compensating share from development.

Transfer deals would need to be carefully designed and 'sold' to resource owners as part of an overall incentives package. Their success will depend partly on adapting traditional cultural practices to conservation needs, for example wealth sharing with neighbouring communities where cultural ties (eg. through intermarriage) exist.

Figure 2: Protected Area II

Economic Issues

Ensuring long-term economic viability for small business enterprises, particularly in remote locations, is likely to be a problem area for ICADPs. The structural economic constraints to small business development are discussed in this section.

Fragmented markets

PNG's internal markets are small and scattered. Low rural incomes, dispersed human settlements and a rugged physical topography reduce opportunities for achieving economies of scale, curtail market access and increase distribution costs. The remoteness of markets also leads to 'information failure', whereby producers are unaware of consumer demands and current price trends and face increased risk in marketing. The Fresh Produce Development Corporation, with financial and technical support from the New Zealand Government, is tackling this problem. Price data (for the main urban centres), and information on market needs (including quality requirements) has been made available in an easily understood format to fruit and vegetable producers in the highlands.

Additionally, many forest products are collected from the wild for home consumption. Forest decline is catalysing market development for many products traditionally collected from the wild, but no longer available in ecologically depleted areas. This affects such products as bird plumes (especially from birds of

paradise) for traditional body decorations (*bilas*) and cassowaries for cultural exchange and consumption in the highlands.

Infrastructure

A dearth of basic economic infrastructure, particularly of transport and communications, is a second important impediment to trade. The country's road coverage is sparse, with a density of 5 km per 100 km² of land area (Gumoi & Sekhran, 1995). Therefore, produce must often be airfreighted to markets, significantly decreasing producer returns. This especially affects perishable products, particularly those with low weight-to-value ratios. It is less important for durable products, such as the wooden artefacts manufactured in the Sepik region, which can be stored to await periodic collecting trips by buyers. Paradoxically, while the poor road network reduces the viability of small business enterprises in distant villages, it also serves to protect the forest resource from large-scale exploitation by mining operations or timber concessions.

In addition, coastal shipping between PNG ports is exorbitantly priced due to small shipment volumes and over-capacity. The in-country cost of shipping a twenty ton container is higher from Port Moresby to Lae, than from Port Moresby to Singapore (SRI International, 1992).

High input costs

High electricity and telecommunications costs, relative to those of competitors, and high factor (land, labour, capital) costs, especially in terms of land access, have been hurdles for small enterprise development in PNG (SRI International, 1992). While access to land may be less of an obstacle for ICADPs, using participatory implementation methods, other input costs remain high. A five minute call between non-adjacent provinces in PNG costs US\$ 2.9, and the cost of electricity provision (where available) ranks amongst the world's highest at some \$ 0.19 per kilowatt hour (ibid). Development ventures in remote forest regions will need to generate their own power at considerable cost. Finally, law and order problems feed into high production costs by increasing security overheads and insurance premiums relative to those in competitor countries; the risk of armed robberies is a major problem for remote operations.

Skills shortages and labour productivity

The lack of skilled labour in technical disciplines and business administration

increases costs and reduces the likelihood of successful small business development. Top rates must be paid to attract trained local expertise, and a dependency on expatriate human resources, including external technical assistance and volunteers, is a major and costly constraint. In general, high wage levels and poor labour productivity relative to competitor nations, are serious impediments.

A critical challenge is therefore to build small business management capacity, especially at the community level. For ICADPs to meet their objectives, training is needed in such areas as project preparation, written communications skills, basic book-keeping, conflict resolution, problem-solving, and money management. Efforts are also needed to raise functional literacy levels so that the wider community can participate more fully in project initiatives.

Rural credit

PNG's banking services are fragmented and rarely extend to isolated rural settlements. This significantly increases transaction costs for formal credit. The high risk of default makes banks wary of lending to rural resource owners. The latter's lack of collateral and low savings capacity diminishes their access to formal credit. Loan payback periods are typically short, and this, coupled with the high cost of loan finance, discourages sustainable natural resource extraction.

Such constraints have led to the failure of a number of rural development interventions, and are likely to adversely affect business development opportunities pursued under ICADPs. World Bank comparative indicators show, for example, that smallholder coffee production costs in PNG are, on average, three times those of neighbouring Indonesia (DoFP, 1993). In spite of all this, there have been some notable successes, for example the diversification of agricultural production in the highland provinces and increased marketing to the urban centres of Lae and Port Moresby.

Timber royalties

Several commentators (eg. Aitkins, 1993) have pointed out that so-called 'green industries' cannot compete with logging. Though this ignores the future earning potential of forests, unfortunately scant empirical evidence exists to the contrary. Given that resource owners received on average some K¹ 3.2 per cubic metre in royalties, in 1994, when some 3 million cubic metres of timber were harvested, they could have earned as much as K 9.6 million. Royalty earnings form only a portion

¹At the time of writing a Kina was equivalent to about US\$ 0.75.

of total benefit flows to resource owners, who receive benefits from employment, road development, social infrastructure provision and a share of the logging operations' gross income. One estimate, based on a micro-study of a current operation, puts the total amount captured by resource owners at some 7.8% of gross income (Sekhran *et al.*, 1995).

A new timber royalty system, yet to take effect, has been proposed by the Government. This would increase royalties for existing logging projects to K 7 per cubic metre. Moreover, all new projects, plus existing projects applying for permit renewals, will be required to pay an additional share of gross revenue (a premium) to resource owners. The premium will be negotiated on a case by case basis, subject to a minimum amount (based on the f.o.b. price of timber). Under the new regime, resource owners, countrywide, would receive approximately K 21 million in royalties, per annum. For a new project, harvesting 100,000 cubic metres a year, the annual payout could be as high as K 2 million (again given a timber price of K 200 per cubic metre). It will be difficult for alternative forest uses to compete with these levels of income.

Stakeholder preferences for immediate benefits

Large-scale development ventures, by paying resource owners an extraction rent for use rights, are able to provide immediate benefits. ICADPs are generally unable to compete on the same time scale, particularly if a thorough participatory planning process is adopted. The importance resource owners attach to sustainable development and future welfare, relative to their immediate needs, is, therefore, of critical importance.

A number of other factors could influence the receptiveness of resource owners to conservation options. Conservation awareness or environmental education can play an important role by identifying the community welfare implications of various land-use options – this can be assisted according to the degree to which people still depend on the forest resource for subsistence and for their spiritual-cultural well-being. Advocacy can also help to strengthen or re-establish a conservation interest in land, but it is important to remember that rural communities are not homogeneous entities, and community sub-sets, with different levels of influence, are likely to place different values on resources.

Community motivation

Alternative development opportunities are often labour intensive, and the labour

costs of extraction of many forest products are high, or perceived to be high by local communities. This raises the question of motivation. Will communities opt for the relatively easy money from industrial logging, for which the work effort requirements are minimal, or will they choose the conservation options requiring a greater investment of time and effort? What is the minimum return to labour required to offset its opportunity cost?

Though it is difficult to make broad conclusions, the experience of some projects (including the GTZ-financed Morobe Coastal Fisheries project) suggests that in some areas, the demand for income provides insufficient motivation for resource holders to increase work effort and productivity to at least the minimum levels required to ensure the viability of micro-enterprises. Though resource owners do, of course, demand income, they seek income generating avenues that require little labour effort – hence the attraction of royalty-generating logging projects.

Alternative development opportunities

The following issues are relevant to ICADPs in their search for alternative development opportunities. Table 1 includes a list of products that could potentially be exploited for the purposes of income generation.

- ! The number of options available for immediate development is likely to be small. Based on the lessons learned in developing markets for Amazonian rain forest products in North America, Cultural Survival estimated that it takes 5-10 years to develop a stable market and obtain significant benefits (Plotkin, 1992). However, there are many products with already developed, or developing, world markets such as 'green' timber, insects, crocodile skins, rattan, shitake mushrooms, eco-tourism and handicrafts, although the development potential of some of these may be small. There may also be potential to develop positive conservation-development incentive linkages through activities such as artisanal fisheries, the culture of giant clams and prawns, mushrooms, and organic coffee.

Table 1: Potentially Exploitable Products with Direct, Indirect, Non Consumptive and Future Use Values.

Direct Use Values (Forest Products)	Indirect Use Values (Ecological Services)	Non Consumptive Uses (Ecological Services)	Future Uses (Ecological Products & Services)
Timber and wood products including handicrafts.	Tree plantations.	Ecotourism.	Pharmaceutical products.
Fuelwood.	Cash crops, including coffee, cocoa and taro, grown in the forest periphery.	Resource rents, as an incentive to maintain land in a conservation-compatible manner.	Existing products that currently lack markets.
Fruits, nuts and fungi including <i>galip</i> nuts, pandanus nuts and <i>okari</i> nuts, breadfruit, <i>pit-pit</i> and <i>aibica</i> . Some 500 species of plants are grown for consumption in PNG, with 45 species vital for subsistence (French, 1994).	Carbon swaps (for carbon sequestration services).	Access fees for research.	Plant germplasm, including for winged beans, sugarcane and sago.
Plant oils including aromatic compounds. Tannins.	Resource conservation fees to protect hydrological and other forest functions.		Recreation.
Rattan and bamboo.			Resource conservation fees to protect vital forest functions.
Orchids and decorative plants.			
Sago and <i>Nipa</i> palm products.			
Wild fauna, including insects, fish, and crocodiles.			
Exudates, including tree gums, copal resin and gutta percha.			

- ! There is a need to identify ‘niche’ markets, especially for international and the more easily penetrated domestic markets. Possibilities include duty-free airline sales of vacuum-packed *galip* nuts, the Southern Highlands market for cassowaries, the Japanese market for *shitake* mushrooms, and the Hong Kong market for live fish. Given the difficulties of gaining access to many world markets, particular emphasis should be placed on domestic opportunities. But careful analysis of any market is needed to avoid saturation of demand.

- ! A balance needs to be found between cultivation and ‘wild’ harvesting, involving an assessment of the economic and ecological interactions. For example, will increased domestication reduce the price of the wild product, and thus the conservation incentive?

- ! The welfare implications of commercially-oriented wild harvesting need to be carefully considered. Distributional analysis is important to establish whether subsistence losses are likely to be outweighed by income gains for the community as a whole.

- ! A range of alternative income-earning opportunities should be developed to reduce the economic and biological risks in focusing on one or two development options. The ‘green’ timber market, for instance, includes wood ‘bits’ (consisting of timber for paint brush handles, etc.), in addition to sawn timber. A diversified strategy would focus on markets for both types of product.

- ! Value added at the local level can be maximised, for example by treating and kiln-drying timber, or the development of a rattan furniture industry.

- ! If conservation is justified on purely economic grounds, problems may arise if people aspire to higher incomes than can be provided by ICADP interventions. In such circumstances, communities would either sell out to the highest bidder or increase extraction of forest products beyond sustainable levels. Therefore, material incentives alone are unlikely to achieve conservation objectives. Other ‘moral’ incentives are needed to reinforce traditional cultural attachments to natural resources, for example by emphasising customary management practices and the maintenance of sacred groves. It is therefore necessary to challenge communities as a whole to rethink their strategies for development.

Loss of traditional knowledge

The increasing erosion of subsistence and cultural attachments to biological resources is diminishing the receptivity of younger generations to the accumulated knowledge of community naturalists. It is, therefore, important that economic value be placed on the accumulation of such knowledge. However, worldwide, the resource custodians and those holding genetic and resource use knowledge, have received only a fraction of the dividends from bio-genetic prospecting (see for example RAFI, 1994). Though PNG is a Party to the Convention of Biological Diversity, it has no legislation to protect indigenous intellectual property rights.

'Conservation rents'

If alternative industries do not prove viable options, or compete well with logging, resource owners could be provided with 'conservation rents' or payments as an incentive not to 'sell out' land to other, ecologically destructive, uses. Such payments would be justified on the basis that a large proportion of the benefits of biodiversity conservation accrues to global communities, but the (opportunity) costs entailed in the establishment of conservation areas are largely borne by local resource holders. In other words, global communities (particularly in the North) obtain a major proportion of the benefits without paying a fair share of the costs of conservation. However there is little sign as yet that 'consumer' nations are prepared to make the economic sacrifices necessary for international transfer payments to high biodiversity countries like PNG.

General Social Impact Issues

The social dimensions of ICADPs, given a PNG context in which social systems and community values are rapidly evolving, and where there is high social heterogeneity, present another set of challenges. An important lesson from the implementation of Integrated Rural Development Projects in PNG is that ICADPs will need to carefully monitor the social impacts, paying particular attention to the distribution of income from development activities, both within and between communities in, or adjacent to, proposed conservation areas.

Filer (1992), has distinguished between the 'stratification' and 'alienation/demoralisation' effects of development. Though Filer's work was set in the context of the development of the mining industry in PNG, his arguments can be applied to ICADPs. The 'stratification' effect occurs when the costs and benefits of development activities are unequally distributed within or between affected

communities, leading to greater actual or perceived inequity. This, in turn, may contribute to both intra and inter-community social conflicts over the use of resources or the distribution of development benefits.

It will be important to identify group membership of landholding units to ensure that they are appropriately drawn into conservation efforts and fully benefit from development incentives. One option would be to establish resource owner groups, with membership determined by the resource owners themselves, and to involve them in the process of 'social mapping' necessary for customary units to obtain recognition under PNG law. An 'arbitrations council', comprising resource owners and representatives of local institutions, such as community governments, would be necessary to adjudicate in the event of disputes between resource owner units.

There are a number of mechanisms for redistributing the benefits from development, apart from employment and subsequent trickle-down. One way is to pay royalties (from the development activity) to incorporated land groups or other acceptable community structures. The exact distribution mechanisms should be developed by communities themselves through a participatory planning process. It is anticipated that for each ICADP, a package of economic development options will be available. Returns to each activity will vary considerably, and not all of them will be able to pay large royalties. As already mentioned, it will be important to establish the 'incentive price' for labour, to ensure a fair return. This will determine the residual amount available for redistribution.

Filer's (1992) 'alienation/demoralisation' effect refers to alienation from traditional social structures and value systems. The development of ecotourism, for instance, by increasing exposure to outside cultural mores can lead to a cultural erosion. The disaffection of key groups (particularly youth), who become detached from the ICAD process, may be a problem over time. This is likely to happen, for instance, as the cash demands of such groups manifests itself in the form of growing resentment against traditional and introduced conservation management restrictions on their activities.

Conclusion

The issues charted in this paper point to the enormous obstacles that must be overcome for the realisation of ICADP objectives. The challenges outlined do not

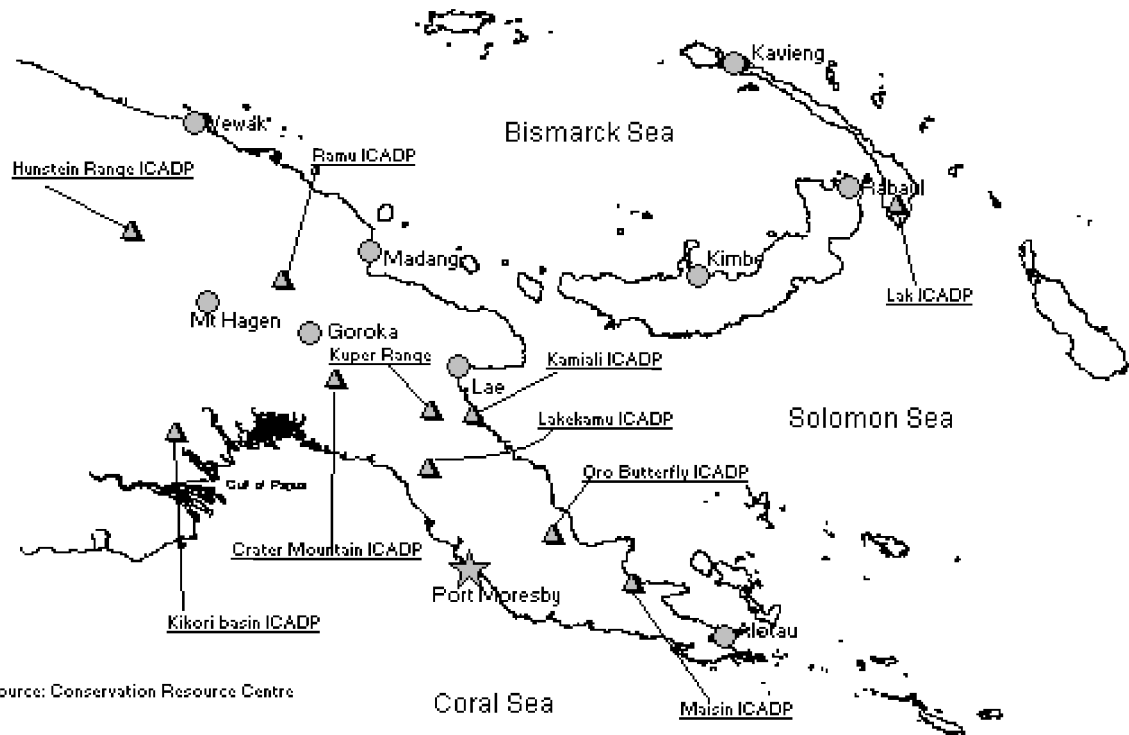
lend themselves to quick-fix solutions. The replicability of ICAD methodologies, in a PNG situation characterised by high cultural and geographical diversity and variation, is limited. Thus many of the solutions will be site specific. Clearly, an important need at the inception stage of ICADPs is to consider the complexity of the process, and design interventions, if possible, in ways that reduce risk and uncertainty.

Finally, a number of issues are still unknown or insufficiently understood. For example, an unresolved issue concerns how best to structure micro-enterprises to promote accountability to the broader community, encourage sound management, and provide performance incentives for individual entrepreneurs, given the prevailing socio-cultural conditions. The present round of ICAD-type projects should provide a wealth of information on conservation and development processes and activities, which should feed into the design of the ICADPs. These projects will no doubt uncover additional issues and cast light on existing ones.

Acronyms

AusAID	Australian Agency for International Development (previously AIDAB)
CI	Conservation International
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	PNG Department of Environment and Conservation
ESCOW	East Sepik Council of Women
FSP	Foundation of the People of the South Pacific
GEF	Global Environment Facility
GTZ	German Agency for Technical Cooperation
ICADP	Integrated Conservation and Development Project
NGOs	Non-governmental organisations
NSO	PNG National Statistical Office
NTFP	Non-timber forest product
PNG	Papua New Guinea
RCF	The Research and Conservation Foundation of PNG
UNDP	United Nations Development Program
VDT	Village Development Trust
WEI	Wau Ecology Institute
WWF	World Wide Fund for Nature

PAPUA NEW GUINEA (Approximate Location of ICADP's and Major Towns)



Source: Conservation Resource Centre

Appendix 1: List of ICADPs with Details of Habitat Covered, Levels and Types of Threat and Possible Development Opportunities.

ICADP	Implementors	Habitat Covered	Level of Threat	Type of Threat	Sustainable Development Options
Crater Mountain	RCF/WCS	Hill/montane forest	Low-medium	Upland areas: subsistence; Lowland areas: logging/subsistence	Ecotourism, handicrafts, subsistence improvements
Lak Conservation Area	DEC/UNDP/ Selected NGOs	Lowland – montane forest	Lowland – high; montane – very low	Logging	Sustainable forestry, horticulture, <i>galip</i> nuts
Hunstein Range	ESCOW/WWF	Hill forest	Medium	Logging/subsistence	Ecotourism, crocodile farming
Kikori Basin	WWF	Mangrove/ swamp/hill forests	High	Logging	Sustainable forestry, other products under investigation
Ramu	DEC/UNDP/ Selected NGOs	Alpine grasslands – lowland forests	Low	Subsistence; logging threat likely in medium term	Under investigation, possibly horticultural products, crocodiles, ecotourism
Lakekamu- Kunimaipa Basin	FSP/CI/WEI	Hill forest	High	Logging	Ecotourism, sustainable forestry
Kuper Range	WEI	Montane forest	Medium-high	Logging/mining	Ecotourism
Oro Butterfly	DEC/AusAid	Lowland-hill forest	High	Logging	Butterfly ranching, ecotourism, sustainable forestry
Maisin ICADP- Collingwood Bay	Greenpeace	Lowland-montane forest	Medium-high	Agriculture/logging	Handicrafts, fisheries
Kamiali Conservation Area	VDT	Lowland	Medium	Logging	Fishing, sustainable forestry

Source: Conservation Resource Centre

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