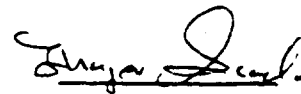


LAO PEOPLE'S DEMOCRATIC REPUBLIC

NAM THEUN 2 HYDRO PROJECT

**REPORT OF THE
INTERNATIONAL ENVIRONMENTAL AND SOCIAL
PANEL OF EXPERTS**


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Vientiane, Laos PDR
February 7, 1997**

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**REPORT OF THE
INTERNATIONAL ENVIRONMENTAL AND SOCIAL
PANEL OF EXPERTS**

**For the Nam Theun 2 Hydro Project
Laos Peoples Democratic Republic**

**Vientiane, Laos PDR
February 7, 1997**

INTRODUCTION

The Panel and Its Role

This is the first report of the International Panel of Environmental and Social Experts (POE or the Panel) for the Nam Theun 2 Project in the Lao People's Democratic Republic. The panel members are:

T.Scudder, PhD (Harvard), California Institute of Technology, USA
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According to the Panel's Terms of Reference, its primary responsibility is "to provide independent review of and guidance on the treatment of environmental and social issues associated with a project under preparation." While the POE's findings and recommendations are to be submitted directly to the Ministry of Industry and Handicraft and to the World Bank, it is free to make its own determination on which environmental and social issues it should focus. In the Nam Theun 2 case, the POE interprets its purview to include the entire Nam Theun River basin from the border of Vietnam to the Mekong River, interbasin transfers from the Nam Theun to the Xe Bang Fai and Nam Hinboun rivers, the NT2 transmission line, and whatever enhancement and other projects are impacted upon by water releases from the Nam Theun reservoir. The Panel is also obligated to assess the extent to which planning for the NT2 project meets World Bank environmental, indigenous people, resettlement with development and other guidelines.

Summary of Panel Activities (see Annex 2 for the Panel schedule)

The Panel members arrived in Vientiane on January 24, 1997. Following meetings and briefings with GOL officials and NTEC, two days were spent on a helicopter flight over the NT2 Project area and on meetings in Laksao, Nakai and Thakhek. Three days were then spent in Vientiane attending a National Workshop on the NT2 Project and the associated studies, reviewing documentation and meeting further GOL officials and consultants involved with the project. The next seven days were spent on a reconnaissance of the project area by 4-wheel drive

vehicle, boat, helicopter and on foot, visiting the plateau, catchment area, proposed extensions, villages and project sites, and participating in a workshop on watershed and protected area management. The final two days have been spent preparing this report and briefing GOL officials.

This is the first of a projected series of visits to Laos by the Panel under its Terms of Reference and Scope of Services (Annex 1). As such it is an initial and introductory visit. While we have been able to review a large amount of information and to make extremely useful visits to the site, in the two weeks available no attempt has been made to cover the whole range of information and issues involved. Further, a comprehensive environmental assessment of the NT2 Project and a number of individual studies into the various environmental and social issues involved in the project are underway or are being initiated. We feel that it would be premature for the Panel to comment on the substance of these issues until the results of the studies are available. Consequently, this report is to be considered as a preliminary and introductory one, focussing on the issues which at this stage have appeared to be most urgent and/or evident. The many other issues of importance will be covered in subsequent Panel visits and reports.

Acknowledgments - Appreciation

The Panel's activities are summarized above and the itinerary is outlined in Annex 2. While the Panel met with more Government officials, villagers in project areas, and representatives of private sector firms and nongovernmental organizations (NGOs) than can be thanked by name, we wish to acknowledge with gratitude the information, advice and assistance, as well as the warm welcome, that we received from everyone to whom we talked. Special thanks are due to the Minister and Vice Minister of the Ministry of Industry and Handicraft, The Nam Theun 2 GOL Representative, the Governor of Khammouan Province, the President, Vice President and Director of Environmental Assessment of STENO, the Chairman of BPKP, and the Chairman, Vice Chairman and GOL NT2 Representative of the Resettlement Committee. Special thanks also go to those in the World Bank, NTEC, IUCN and WCS who gave us the benefit of their knowledge and insights and who provided us with reports dealing with activities to date.

List of Acronyms and Abbreviations

BPKP	Bolisat Phathana Khet Phudoi (Mountainous Region Development Company)
CPAWM	Centre for Protected Areas and Wildlife Management (within Forest Dept.)
CPF	Conservation and Protected Forest (correct translation of NBCA qv)
EIA	Environmental Impact Assessment
GEF	Global Environmental Facility
GOL	Government of Lao PDR
IUCN	International Union for the Conservation of Nature
NBCA	National Biodiversity Conservation Area
NGO	Non-governmental Organization
NH	Nam Hinboun Hydro Project

NNT	Nakai- Nam Theun
NNT-NBCA	The Nakai-Nam Theun National Biodiversity Conservation Area (a portion of the NT2 Project).
NTSEP	Nam Theun Social and Environmental Project
NT2 Project	The Nam Theun 2 Hydro Project
POE	International Panel of Environmental and Social Experts
STENO	Science Technology & Environment Organization (reports to prime minister's office)
WB	World Bank
WCS	Wildlife Conservation Society, New York

1. Overview

1.1 The Project in the Context of International River Basin Projects

By international standards, the Terms of Reference for the POE (Annex 1) cover a very complicated attempt at river basin development. In addition to the Nam Theun 2 dam and hydro project *per se*, that attempt involves the NNT NBCA which the Government of Laos wishes to incorporate within its development planning for purposes of biodiversity (including biodiversity mitigation for other parts of the NT2) and watershed management. Then there are the cumulative impacts of the NT2 and NH projects with the latter involving another major interbasin transfer.

The Nam Theun 2 hydro component alone is complicated by international standards. In part this is because of its interbasin transfer to the Xe Bang Fai River via a 38km canal. In part it is due to the institutional complexity of NT2. On the one hand it involves the World Bank family of agencies in a pioneering effort with the private sector and a national government to build, own, operate and transfer (BOOT) a major hydro project. On the other hand, within Laos the usual dichotomy between central and decentralized forms of government is made more complex by the semi-autonomy of BPKP as a government parastatal body responsible for both the development and the conservation of the central mountainous areas including the upper Nam Theun basin. Those two responsibilities can easily prove conflicting. For that reason alone it is essential that the necessary decrees, regulations and laws not only be incorporated as conditionalities within project documents during negotiations with the World Bank family of agencies, but that they be in place, as ascertained by a pre-effectiveness supervisory mission, before disbursements commence. Their implementation then must be carefully monitored during subsequent supervisory missions and by an independent monitoring agency.

A further institutional issue relates to the overall regional planning for the project and the relationship of that planning to national planning. NT2 is a national project with the Ministry of Industry and Handicraft being the responsible government agency and the Minister the chair of the central working committee that deals with policy issues within the project area. The Panel commends GOL for defining that area as extending throughout the central region of the Lao PDR from the Vietnam border to the border with Thailand. That means the NNT-NBCA is

incorporated along with the NT2 dam and hydro development and the NH hydro project with their interbasin transfers. The Ministry of Industry and Handicraft is also responsible for ranking water resource development projects within the Lao PDR not just in regard to hydro potential, but also in regard to social and environmental issues, a wider range of economic issues, returns on investment and sources of finance. The international experience is that such broad responsibilities are too much for a single ministry. Though the situation in the Lao PDR may be different because of the active involvement of the Deputy Prime Minister in NT2 planning from the start, and the ongoing interest of the Deputy Prime Minister and the Prime Minister in the project, including solving conflicts as they occur, the Panel believes that the effectiveness of this institutional setup need be re-evaluated at regular intervals. The same caution applies to the availability of finance to plan and implement policies formulated by the working committee.

Major dams and interbasin transfers not only are associated with major risks but also with uncertainty. Risks one can anticipate and perhaps deal with. Uncertainty is another characteristic entirely. Knowledge of the impacts of major river basin development projects remains insufficient to understand, let alone forecast, future events. This is especially the case in the Lao PDR due to incomplete hydrometeorological records and, associated with a small country, relatively weak planning, implementation and monitoring capability. Yet another factor is the absence of a national approach to an integrated river basin development program whereby projects were selected after a careful ranking on the basis of a broader set of environmental, economic and sociopolitical criteria than just hydropower ones.

As outlined in the sections that follow, the POE wishes to draw attention to a number of very difficult, and perhaps, intractable issues that could significantly reduce the benefits and increase the costs that GOL, the WB and the private sector believe to be associated with the NT2 project.

In this initial report, the Panel has not been able to explore all the environmental and social ramifications of the NT2 Project. Rather emphasis has been placed on the Nakai Plateau and on the NNT-National Biodiversity Protection Area (NBCA). Reference is also made to socio-economic issues associated with the 38 km canal, and the various proposed NBCA Extensions. Attention to downstream cumulative impacts on the Nam Theun River of the NT2 and Nam Hiboun Project, to flooding implications of interbasin transfers, and to project enhancement options within a wider area are also critically important issues that must be addressed during subsequent missions.

The Nan Hiboun experience is instructive here. While earlier studies minimized impacts later ones concluded that nearly 10,000 people would be affected because of reduced yields of fish (which constitute the main source of protein) and because of increased flooding. Interbasin transfers from the NT2 reservoir to the Xe Bang Fai will release over twice as much water and can be expected to have still larger impacts. While the Panel understands that water quality studies have been contracted to the University of Western Australia, equivalent socioeconomic studies of water transfer impacts are also necessary. Especially important will be studies of the

impact of increased dry season water levels on flood recession agriculture, of rainy season levels on flood extension into paddy areas, and of the new annual regime on fisheries.

1.2 Brief Description of the Project

The NT2 Project involves constructing an approximately 50m high dam on the Nam Theun River near its north western exit from the Nakai Plateau, which would create a shallow, 450 km² reservoir inundating riverine and mixed pine forest on the plateau. A diversion tunnel will be built near the southeastern end of the plateau which allows the water to fall 355 meters to the power station located at the base of the Phou Ak escarpment. The installed capacity of the system would be 681 MW. The outflow will be released via a 38 km. canal into the Xe Bang Fai River, a different river system from that below the dam. The project also involves construction of a 147 km. transmission line from the turbines to the Thai border, construction of 201.2 km of new roads and upgrading of 37.2 km of existing roads.

The Project includes the Nakai-Nam Theun Biodiversity Conservation Area (NNT-NBCA, which is also called the Nakai-Nam Theun Conservation and Protected Forest Area) which covers c. 3,500 km² between the reservoir and the Vietnam border and comprises about 70 percent of the catchment area for the reservoir. Funds from the project will help manage this area which is of international significance for its biodiversity. Several extensions to the NBCA have been proposed, primarily to protect remaining areas with outstanding biodiversity and to provide links between the NNT-NBCA and other protected areas.

Approximately 4,500 people now live in the area to be inundated and they will need to be relocated to nearby areas.

1.3 Key Issues

The NT2 is an extremely complex project. While, as noted above, other issues will be considered in this and subsequent reports, the following represent what we consider to be the key non-prioritized issues on which we have focussed our attention and recommendations at this stage:

- Management of the NBCA, including conservation of its unique biodiversity, maintenance of its watershed values, and consistent with these objectives, treatment of the 5-7,000 people now resident within it. Success in combining conservation and development in this area is crucial to the success of the NT2 Project as a whole. But at the same time, the Panel regards this issue as the most difficult task faced by the project and the one which has the greatest uncertainty of success.
- Addition of the proposed extensions (especially the Corridor and Northern Extension) to the NNT-NBCA, and more important, effective management of

them;

- Biodiversity values of the Plateau area to be inundated;
- Resettlement with development of the 4,500 people in the inundation area;
- Impacts of the 38 km canal on adjacent villages;
- Implementation and Management Capacity;

2. Nakai Plateau Including the Area to be Inundated

2.1 Terrestrial Biodiversity

Most of the plateau area which contains forests of *Pinus merkusii* has been or is being logged and some of it has been subjected to shifting and other cultivation. Apparently hunting and collection of non-timber forest products has been intense. Other than a few pockets of pine or mixed broadleaf forest and possibly some riverine strips, most of the terrestrial area of the plateau is considered to be substantially modified by human activity and from a biodiversity standpoint substantially degraded from its original status.

A series of rivers run southwards down to the plateau to join the Nam Theun River, and the forested stretches of this slow-moving watercourse, winding along much of the plateau toward the northwest, "probably represent one of the best areas of sluggish lowland riverine habitat in south and central Laos"(WCS, 1995). This watercourse with its river bank vegetation reportedly provides habitat for some rare species of birds, such as the threatened white winged duck, and a variety of fishes. However, in much of the plateau area the riverine vegetation has been significantly affected by human activity. In many areas there is cultivation (at least swidden shifting cultivation) right up to the river bank, and nearly all larger trees apparently have been cut. Much of the present river bank vegetation is bamboo which often forms a narrow strip between the water and the bank tops. The sandy river banks are eroding and cutting back and the river course appears to be rapidly widening in many areas, at least in part due to the recent severe flooding. Density of terrestrial wildlife is very low and hunting pressure both for subsistence and for trade is very heavy.

The pine forests are among the most extensive in the Lao PDR. They are maintained by periodic fire and some grazing. Stages of succession to a broadleaf forest can be seen, partly in the zone to be inundated and partly along the sides of the reservoir.

2.2 Aquatic Biodiversity

Recent surveys have indicated that there are some significant species of fishes in the rivers on the Plateau (Kottelat. 1996a). For example, of the 165 fish species identified in 1996

(60 in Nam Theun and 131 in the Xe Bang Fai), 46 were not previously recorded from Lao PDR. Additional investigations are planned for other parts of the region to determine whether the species involved are unique to the Plateau or are more widespread. This information will help to assess the biodiversity significance of the aquatic environment which will be inundated by the reservoir. Further information also is needed on the other aquatic biodiversity of the plateau area, and on the probable impact of the creation of the reservoir on it.

2.3 Impact of Inundation

The terrestrial ecosystems of the 40 percent of the plateau to be inundated are substantially degraded. The pine forests are arguably the most important and they will be well represented in the areas around the reservoir. WCS(1995a) identified four kinds of rivers. Close examination of their Fig.2.3 against the shore line as mapped by NTEC shows that only river type A "lowland sluggish rivers and streams with still deep pools, few rapids, high banks, still backwaters, many sandbanks" (their Table 2.2) will be lost, and that along the Nam Nian, Nam Sot and Nam Mon; about half of this river type in total will survive along the Nam Theun, Nam Noy and Nam On. The rare white winged duck has perhaps 6-12 pairs on rivers types A and C out of a known world population of 330 (WCS 1995c, p.5), which could be in the low thousands (loc.cit.,p.26). WCS (1995c) suggest that the Xe Kong river is the only other one like those of the Nakai plateau. It would be useful to have more information on it.

3. The NNT-NBCA and Proposed Extensions

3.1 Significance to the NT2 Project

3.1.1 Biodiversity Mitigation

From the environmental standpoint, the major trade-off of the NT2 Project is the loss through inundation of approximately 40 percent of the Nakai Plateau, plus impact on aquatic biodiversity and environments downstream in the Nam Theun and Xe Bang Fai rivers; versus the possibility of effective conservation of the NNT-NBCA and extensions. As noted briefly below, the NNT-NBCA is regarded as a globally important and in many ways unique biodiversity area. It is already under substantial threat from hunting for subsistence and trade, logging, and expansion of settlements. Although the wildlife has been depleted in portions of the area, the forest cover toward the Vietnam frontier in a significant portion of the roughly 3,500 km² area remains intact. However, unless effective conservation measures are implemented, the biodiversity of this area will quickly degrade.

Under the NT2 Project as currently planned, as mitigation for the environmental losses caused by the creation of the reservoir and hydro-project, the NNT-NBCA would be established and managed by the Government as a conservation area with some funding (a promised one million dollars U.S. a year for 30 years) guaranteed from the private sector operators of the project. Consequently, the NT2 Project appears to offer the best available chance to save at least

key parts of this truly important area with its biodiversity.

3.1.2 Watershed Protection

The NT2 reservoir will be relatively large in surface area (450 km²) but very shallow with an average depth at full storage level of 7-8 meters. The active storage when full is 2690 million meters³, but the dead storage is only 490 million meters³ or less than twenty percent of the active storage. This is the reverse of most reservoirs, where there is usually a very high percentage of dead storage which can absorb sediment without affecting the operation of the reservoir. Consequently, the NT2 reservoir is particularly vulnerable to lost capacity and shortened project life from sediment load in the inlet watercourses.

While flying over the area the Panel noted that there was a highly visible sediment load in essentially all streams and rivers immediately below areas which were significantly affected by shifting cultivation or roads. There were also numerous large landslips or landslides, mostly in current or old shifting cultivation areas, which clearly augmented the sediment load in some streams. While the proximate cause of the recent landslips presumably is last (1996) September's particularly heavy rains, they are indicative of the potential sediment problems aggravated by human land use in the watershed. The visible sediment load, with resultant sand banks and other sediment deposits, was seen to increase significantly down the rivers and streams to where they joined the Nam Theun River on the Nakai Plateau. It appears clear to us that increased human use (cultivation, road building, logging) of the watershed area which leads to denudation of vegetation will lead directly to substantially increased sediment delivery to the plateau.

Consequently, it is our belief that protection of the water catchment area is absolutely essential to the success and sustainability of the NT2 Project, and particularly to the achieving and maintaining the generating capacity which has been used as the basis for the cost/benefit rationale for the project. Therefore, stopping the expansion of shifting cultivation and other clearance in the PCF will be crucial to the success of the NT2 Project.

3.2 Biodiversity

3.2.1 Significance

The Nakai-Nam Theun National Biodiversity Conservation Area, created in 1993, comprises the main part (approximately 70 percent) of the catchment area for the NT2 Project. Covering 3,710 Km², the area extends from the Nakai Plateau north to the Vietnam border on the crest of Annamite mountain range. The forest cover comprises pine forest at c. 600m elevation on the Nakai Plateau to several lowland evergreen broadleaf forest types to upper montane forest. Small stands of *Fokienia*, a cypress, grow in pockets of high elevation rain shadow at over 2,000 m. Since 1993 two large mammals new to science (*Pseudoryx*, *megamuntiacus*) have been found in the area along with several others and a bird which are probably new to science. The area

supports at least 14 globally endangered large mammals, 8 globally endangered birds and 20 birds which are considered globally near-endangered. The area is extremely significant internationally from a biodiversity standpoint, and it is probably the richest and largest wild area remaining in Lao PDR, and one of the largest in South East Asia. As yet little is known about the botany of the area. Besides *Fokienia* another conifer, *Cunninghamia* may occur. These are Tertiary relict genera of limited global range.

3.2.2 Status and Trends

Part of the area was originally a royal hunting preserve, and the biodiversity apparently was largely protected both by that status and its isolation. Although there is some uncertainty about how long various groups have been resident within the NNT-NBCA, their numbers have certainly substantially increased in recent years. In at least five of the six main river valleys which drain the area large and evidently rapidly increasing areas are being opened by shifting cultivation. There are now three Sub-District Headquarters in the area and there is increasing pressure to complete a road linking all these areas with the District Center outside. The road construction was stopped in late 1996 and a moratorium put on its completion on the request of the WB. In addition, extensive logging has been carried out throughout most of the Nakai Plateau, the western side of the NNT-NBCA, and some in the interior. In 1993 a track was cut into the center of the area to facilitate helicopter logging of *Fokienia* cypress, and this road is now reportedly a major trade route for the export from the area of non-timber forest products including wildlife.

The result of this increased human occupation is that while the NNT-NBCA apparently remains outstandingly rich in biodiversity in terms of total number of animal species which still occur there, the density of wild fauna has been greatly reduced and the biodiversity as a whole is increasingly threatened by expanding cultivation, increasing population pressure, intensification and commercialization of hunting and other traditional practices, aggravated by logging and the threat of expanded logging, and by construction of logging and other roads. If the present trends continue, the Panel believes that it will only be a matter of time until the unique biodiversity status of the area is lost.

The role of hunting deserves special mention. In most of the village areas we visited, and reportedly the same is true throughout the NT2 area, many able-bodied males above the age of about ten has a weapon, usually a village-made muzzle loading smooth-bore gun which can be used both as a shotgun for birds and single-ball rifle for mammals. They go hunting with it and/or snares and traps at every opportunity. An often-successful attempt is made to shoot or catch virtually every bird, mammal, amphibian and reptile which is seen. The result is a truly pervasive reduction or elimination of wildlife from all areas which are even remotely accessible to villages, roads and fields. In our experience, the profound influence of this hunting is rarely understood by visitors.

3.3 World Heritage Site Status

The NNT-NBCA and adjacent areas on the Vietnam side of the border, including the small adjacent Vu Quang protected area, have been nominated as a World Heritage Site. Action for formal establishment as such should be undertaken without delay for several reasons: Because of the biodiversity richness, including the presence of the new and globally threatened species, Heritage designation is clearly appropriate. The degree of international recognition accorded by Heritage status can help provide stability in international border areas. Such international status also can afford increased protection to the area, and Heritage status may facilitate additional international financial support for its protection. Lastly, Heritage status of adjacent areas in Vietnam might increase the protection of those areas and thereby augment the security of the NNT-NBCA as well.

3.4 Implications of Logging for the NBCA

3.4.1 Past and present operations

The timber industry is summarized by Margules, Groome, Poyry (1996) (hereinafter MGP) and only a brief resume is given here. Timber is a major source of income to BPKP which operates a series of companies on its own or as joint ventures. MGP estimated that for four years 1996-99 the area of the Nakai plateau to be inundated will yield 400 000 meters³ annually and that for the following six years a further 400 000 meters³ a year can be obtained from areas to the west and south of the new lake, plus timber from two lowland areas in the south of Khammoune Province. The plateau timber is mainly *Pinus merkusii*, with some hardwoods. The annual supply from natural forests will then dwindle to c.100 000 meters³ a year. The timber is partly sold as logs to Thailand and Vietnam and partly processed. The processing industry is an important source of employment in Thakhet where it directly supplies 2000 jobs and a further 600 people are employed in felling. Total jobs provided including ancillaries are about 5000. The big pine logs of 1m diameter or more are good for peeled veneer and hence plywood (1 plymill at Mahaxai). In addition sawnwood (15 sawmills) and mouldings (1 mill) are produced. A chipboard mill at Nakai began production in February 1997; it is able to use small trees, initially from the inundation zone.

Legal logging on the plateau is now confined to the inundation zone which was demarcated by MGP in 1996. Earlier there had been felling also on the areas which are to remain dry. In February 1997 a contractor was fined (thrice the value of the logs) for an infraction and a second suspected one was to be investigated.

Fokienia ('cypress'), the high value conifer (\$US1000 per cubic meter) that occurs at high elevations in the north of the NNT-NBCA close to the Vietnam border, was extracted for a short period by helicopter down to a spur road that ran up a ridge from the new village road from Lak Sao. The operation was suspended in 1996 at request of the WB. *Fokienia* is also being exploited in the proposed Northern Extension where the POE saw a stockpile of c.300 logs. The logs are exported through Vietnam to Hong Kong and Japan.

3.4.2 The Future

Demand for timber is predicted slightly to exceed supply while the dam is being built, by c.200 000 meters³ per year, and this will continue another six years till 2005. After that there will be a deficit of c. 500 000 meters³ per year, based on present demand. Concern was expressed to the Panel that the excess capacity of the logging enterprise could, in future years, lead to increased demands to log the NBCA. Plantations could supply small trees suitable for particle board or pulpwood. The deficit could be filled by a 2000 ha per year plantation programme but the industry would need to be restructured to process small trees. BPKP distributes tree seedlings to villagers, mainly *Eucalyptus*, with the intention to harvest at 10 years age. This programme is still in its early stages. The Lak Sao nursery was destroyed in the great flood of September 1996. The plywood mill at Mahaxai has planted 20,000 ha of *E.camaldulensis/tereticornis*, of a 60,000 ha area allocated to it by GOL, and has plans for a total of 140,000 ha. The plan is to harvest at 10 years and supply wood for chipboard. BPKP has some plantations, the POE saw several small parcels of *P.merkusii* near Lak Sao growing slowly on poor lateritic soil.

3.5 Management Issues

3.5.1 Policy and Legislation

The most urgent need in the area of policy and legislation appears to be to clarify and formalize the NBCA status in the NT2 Project area. National Biodiversity Conservation Areas (NBCAs) were created by Decree, and since 1993 twenty NBCAs have been created, covering about 30,000 km². This represents around 12.5 percent of the nation's area and the Panel notes with great admiration that Laos has one of the highest percentages of protected lands in the world.

The Panel has found uncertainty among many of those we have consulted about just what degree of protection was provided by NBCA status in the NT2 Project area. Among the issues are whether and under what circumstances various activities are allowed. The activities involved include human settlement, cultivation, subsistence and commercial hunting, logging and road building. If the NBCA status is to provide effective conservation, these issues need to be clarified and formally stated (if they have not already been) and clear regulations for the NNT-NBCA area should be promulgated and made widely known and implemented.

3.5.2 Effective Management and Control is Essential

Regardless of the legal status of the NBCA, unless there is active management and control over human activities on the ground nothing will be accomplished. If the NBCA is to be effective there is a series of areas and activities where control is essential. These include, for example:

- establishing zones with various degrees of human activity, including areas which are core areas where no human activities (other than scientific research) are allowed;
- stopping immigration into the area;
- strictly demarcating areas where cultivation is allowed and where it is not;
- strictly regulating subsistence hunting; prohibiting it in core areas; banning guns and snares in appropriate areas;
- stopping commercial hunting (from those within and people coming in from outside) and trade in most wildlife;
- maintaining the borders of the NBCA to exclude illegal entry, cultivation, logging, hunting, etc;
- excluding new road building except the one discussed in Section 4.2 below, and very strictly controlling is use and that of the existing roads;
- developing an effective and trained guard or ranger force (hopefully recruited from those living in and having a stake in the success of the area) to patrol and manage the reserve.

These are only a few examples. A ground staff should be augmented by regular overflights and other methods to monitor the area and provide early warning of illegal incursions and activities.

The environmental literature is filled with accounts of "paper parks", i.e., protected areas which exist on paper but not on the ground. Globally, such areas probably outnumber those where protection is real and effective. We are convinced that the Government of Laos does not want to have non-functional protection of the NNT-NBCA. Further, with the high international interest and participation in the NT2, we believe that ineffective conservation of the NBCA part of the NT2 Project would constitute a serious risk for the whole project.

The challenge, then, is how to achieve the degree of control over the area necessary for effective conservation, while remaining sensitive to the human issues which are involved. It is clear to us that any solution will require the support and active participation of the local people, especially those who live within the NNT-NBCA. Beyond that, at this time we do not have any specific recommendations. Several of the studies at present being undertaken are specifically addressing this key issue, and our purpose in raising the issue is to emphasize its absolutely crucial importance to the success of the NT2 Project.

3.5.3 Capacity

Capacity is another crucial area which we wish to highlight but not to make specific recommendations at this time. All aspects of management of the NBCA require trained and effective personnel, and limited existing capacity has been a problem emphasized in virtually all of our discussions during this visit..

3.5.4 Planning

Comprehensive planning is another requirement for success in projects such as the NT2. We are impressed with the care and detail which has been and is being put into the planning for this project, and we wish to commend the GOL, NTEC, and the other bodies involved.

3.6 Research and Monitoring

The management of the NNT-NBCA will need to initiate basic biological research and to monitor changes in biodiversity. It is known in general terms that the NBCA is very rich in mammal and bird species. Indeed this is thought to be the most important part of the country for these vertebrates and to be both nationally and internationally a key area for their conservation. However, detailed information is lacking, as so far there have only been reconnaissance surveys that have spent in total only a few months in the forest. Existing knowledge is consolidated in WCS (1995a, 1996a, 1996b). The forthcoming WB biodiversity assessment being undertaken by IUCN should fill some gaps and will be finished by mid 1997. In particular it should provide the first data on plants of importance and on forest types.

The POE understands that there is exploitation of animals and plants both for village subsistence and for trade. Work is needed to underpin management for sustainability. Firstly, research is needed to discover what species are traded and the size of their populations. Secondly, monitoring mechanisms need to be set up to make sure exploitation is sustainable. It is also necessary to discover and to map what are the types of forest (eg valley floor alluvial, hillside, ridges, lowland and montane formations, types rich in *Fokienia*, rainshadow versus rain relief types). Biodiversity conservation probably necessitates preservation of samples of all forest types. Zonation into different usage intensities may be a useful management tool. In particular no forest type should be wholly eliminated by future enlargement of village agricultural land.

The POE suggests that analysis of SPOT satellite images plus appropriate ground-truthing might be a good tool for forest typification and that monitoring of the extent of agriculture and the NBCA boundaries could be achieved by repeated SPOT data and its analysis, perhaps annually. As with the human dimension of the development described in Section 4 below, the Panel recommends that linkages with overseas universities and research institutes be developed.

3.7 Conservation Role of North Shore Resettlements

The north shore of the new reservoir will be within the NNT-NBCA. It is accessible by logging road eastwards from a bridge across the Nam Sot. Four villages have expressed a desire to be moved to the future north shore, and others may do so. The view of the Panel is that from a conservation as well as socio-economic standpoint it might be good to have a few villages on the future north shore. They would have to be of circumscribed size, and have access to an agreed and demarcated area of farm land. Their role in conservation would be as 'gatekeepers', providing a source of staff to the conservation authority and policing the whole southern boundary of the NNT-NBCA, perhaps also the eastern boundary, and controlling access along the road from the Nam Sot.

3.8 Proposed Extensions

The proposed extensions to the NNT-NBCA are well covered in Goodland and Whitten (1996), which should be consulted for additional information.

3.8.1 Northern Extension

The forest north of the Lak Sao-Vietnam road and close to the international frontier has a lush forest and is believed to have a wetter climate than the NNT-NBCA itself. It is contiguous with the Vu Quang reserve in Vietnam and both areas contain populations of saola, the new bovid genus *Pseudoryx* discovered only in 1992. Saola have also been found in the NNT-NBCA (Schaller & Rabinowitz 1995). A preliminary survey of this northern area by WCS (1996b), to be followed up by IUCN in 1997, found a rich mammal and bird fauna. The area is penetrated by a logging road and *Fokienia* is being extracted. Much virgin evergreen forest remains, but shifting agriculture is penetrating northwards. This area is under proposal as a new NBCA. The POE strongly endorses this proposal in view of the importance of the area for animals, especially saola, and the possibility of a transfrontier international reserve.

3.8.2 Corridor to Khammoane Limestone NBCA

The other important extension is to preserve a belt of forest between NNT-NBCA and the Khammoane Limestone NBCA, an area of extensive karst limestone hills 15 km to the west. This NBCA is receiving conservation funding from the GEF. This extension is important to provide habitat for the seasonal migration of elephant and other animals which formerly moved across the area which will be inundated. A survey (WCS 1996a) found the forests richer in mammals and birds than NNT-NBCA. The POE considers this extension to be important. The corridor would run both above and below the dam site. It has enclaves towards its western end near the limestone, is only 4 km wide at its narrowest point, and most seriously is bisected by the Nakai-Lak Sao road which will need to be re-aligned when the reservoir fills. Careful planning and monitoring of this road will be essential during and after dam construction and it is important that the forest not be cut back from the road.

If this extension were to be established as part of the NBCA it would have the effect of

enclosing the dam site within a protected area. The Panel recognizes that there is the danger that this action could be misused as a precedent, i.e., to argue for constructing dams within protected areas elsewhere. We believe that the extension is justified by the benefit of providing a potential migration route which otherwise would be lost because of the reservoir. However, we recommend that when the action to establish the extension is taken, GOL should make an explicit statement that the action should not be taken as a precedent which could promote dam construction in protected areas.

3.8.3 Other Extensions

Further small extensions have been proposed to NNT-NBCA . For example, on its north east (Phao-Kata) and south east edges (route 12, "Crater" Corridor) close to the Vietnam frontier. The Panel endorses these extensions also.

4. Project-Affected People

Project-affected people are defined here as those who live within the immediate boundaries of a particular project. They do not include people living in Thailand or elsewhere within Laos who may be major beneficiaries, as electricity users, of the NT2 component. As defined, project affected people can be divided into four general categories. These are those who must be resettled (resettlers), receiving communities (hosts), other affected communities within project boundaries, and immigrants. Of those four categories only immigrants have tended to receive major benefits from programs of river basin development elsewhere in the world.

The relationship between resettlers, hosts and other affected communities is different in the NT2 Project than is the case with other major river basin development projects. In those cases, there tends to be a significant population hosting the resettlers. Such is not the case with NT2 where the host population, aside from those living in the Nakai District headquarters, is small. Another major difference relates to other project-affected people. Elsewhere they tend to be inhabitants of riverine villages below the dam. Their numbers in the NT2 case, however, are small because there is little settlement on the Nam Theun between the NT2 damsite and the reservoir backed up behind the Nam Himbourn Dam. The combined impacts of the two dams, however, can be expected to be significant for communities living below the NH dam.

On the other hand, the Nam Theun 2 project contains two other major categories of other project affected people. These are the current and future residents of the NNT-NBCA and the villagers living along the 38 km canal that takes the interbasin transfer between the NT2 reservoir and the Xe Bang Fai. Quite possibly the severity of project impacts on both those categories may be more serious than is the case with the resettler population. The NT2 component also differs in regard to the number of construction sites most of whose workers will be immigrants, including immigrants from Thailand and Vietnam.

4.1 Resettlers

4.1.1 The Resettler Population: Numbers and Characteristics

The estimated number of resettlers is 4,500 living in 22 communities. Annex 3 contains tables providing information on each community including numbers of households and individuals, ethnicity, and, for 18 communities, cash and imputed income per household. It also includes a map showing their current location within the future reservoir basin. One of the 22 communities is a settlement run by the army for providing beef. Inhabited by army personnel, that community requires special attention. Unless it can be shown to contribute directly to the development of project affected people by, for example, herding out arrangements whereby local villages can increase their livestock, it should be resettled outside the project area. This is especially the case should current surveys indicate inadequate dry and rainy season grazing.

Two major criteria characterize resettlers from the other 21 communities. Aside from the owners of a small number of businesses, the first is that all are indigenous people as defined by the World Bank in OD 4.20. While the fact that practically the entire resettler population comprises indigenous people means that only one all embracing resettlement and development plan is required, that plan must comply with the requirements of the World Bank's OD 4.20 (indigenous peoples) as well as OD 4.30 (resettlement).

While there is no doubt in the Panel's assessment that the resettler population comprises indigenous people, it is important to understand that frequent intermarriage between ethnic groups occurs and that the large majority of men, women and children speak Lao. They also have kinship and other ties with the lowlands, some forged during the war years when some families took refuge there. These characteristics in no way remove those concerned from the "indigenous people" category. Worldwide indigenous people are undergoing change. The large majority want development. But they want development as they define it within the context of their current territory and culture. No evidence, for example, was presented to the Panel that a significant number of resettlers wish to be moved off the Plateau. An interesting concept advanced by anthropologist Stephen Sparks is that, taken together, the resettler population is embraced by a wider Nakai Plateau culture.

The second characteristic of the resettler population is their current difficulty in harvesting sufficient rice and other crops to meet their basic needs. This food deficit has been especially serious during the past five years (i.e., since 1992). Explanations for this situation are complicated and need further careful research. According to information provided and the Panel's own investigations, living standards were considerably higher before the commencement of the Vietnam war in the mid-1960s. During the war years households and villages were traumatized, with many apparently losing the majority of their larger domesticated animals. Hence in several villages the POE was told that all households previously owned buffaloes whereas today a number of households have none while the average number among owners is reduced. Important for increasing productivity as plow animals, buffaloes and cattle were formerly especially important as a source of capital that could be sold to meet food deficits.

Villagers also were consistent in their belief that the frequency and duration of flooding has increased in recent years and had caused additional duress. Cultivated only during the rainy season, the rice crop in many paddy fields has been a total loss, with the most severe floods also responsible for the death of an unknown number of buffalo and other livestock. Correctly or not, our informants associated the advent of such flooding with BPKP timber harvesting.

The most severe flooding occurred during the 1996 season when many households lost their entire crop. For that reason, in two of the villages visited by the POE, some residents, for the first time in their lives, were experimenting with a dry season paddy crop through management of receding flood waters. Presumably associated with the changed flood regime and the decrease in large domesticated animals, as well as other factors such as the war, there has been a steady decline in the quality of the environment. Today people must over-utilize the natural resources of their habitat in order to survive. These resources include both forest products and fauna. Extraction of resin adversely affects the pine trees, while the almost total absence of any birds is a striking feature of the landscape. Use of small mesh nets has also reduced the productivity of the riverine fishery.

4.1.2 Achieving Resettlement with Development

4.1.2.1 The Planning Process

Achieving resettlement with development is more a possibility with the NT2 project than with the large majority of other river basin development projects. There are several reasons for this assessment. One is the current quite destitute state of the resettler population and habitat. Another is their relatively small number while a third is the relatively advanced stage of resettlement planning. That said, the Panel does not wish to imply that resettlement presents a manageable task. The international experience with resettlement in connection with river basin development has been characterized by failure after failure. While resettlement planning has definitely improved in World Bank-financed projects in recent years, it is too early to establish whether or not the implementation of any of those plans will even restore, let alone improve, the living standards of a majority of resettlers.

Within the NT2 Project, resettlement planning is the responsibility of an interagency government Resettlement Committee working closely with NTEC. The Committee was established by Decree January 25, 1995 with preliminary policy formulation and planning commencing that year. The current structure for organizing resettlement is shown in the last chart in Annex 3-4. The Resettlement Management Unit was established during December 1996 and had its first meeting January 31-February 1, 1997, one purpose of which was to discuss staffing needs. At that time the Committee and the Unit had no budget.

Creating a properly staffed, equipped, housed and financed resettlement organization should receive high priority this year, with significant progress required at the time of pre-appraisal. While resettlement currently is not scheduled to begin until the year 2000 and to be

completed during 2002, at least one village has selected the site to which it wishes to move and has expressed the desire to move as soon as possible. It is desirable that such an opportunity be taken by the Resettlement Committee as soon as possible as a pilot project, provided that physical removal can be integrated with the resettlement model selected to improve living standards.

NTEC is also working closely with GOL in drafting a national resettlement policy for all development projects in LAO PDR. Approval would not only make Laos one of the few countries with such a policy, but would demonstrate the government's intention to use NT2 as a pilot project for broader planning and implementation purposes. The Panel recommends that approval of such a national policy be a World Bank pre-effectiveness requirement.

The major goal of both the NT2 and national policies is "to ensure that the population that is resettled materially improve its standard of living after relocation." That is absolutely essential since the international experience with resettlement shows that mere restoration of living standards is, in fact, associated with their reduction. While living standard improvement is made explicit within the emerging resettlement action plan, some portions of the NTEC preliminary draft Resettlement Plan contain wording that could be interpreted as not making resettlers and other project-affected people beneficiaries. One example relates to the frequent use of the word compensation in a way that could imply a form of unacceptable cash compensation. Use of all such terms should be carefully defined in a way that is congruent with the central goal of improving living standards. While the Panel realizes that the Resettlement Action Plan is still evolving, it is essential to ensure that the final documents contain no suggestion that mere restoration of living standards is a policy fall-back position.

4.1.2.2 Resettlement Models

The Panel commends NTEC/GOL planners for expanding initial reliance on a single agroforestry model with a wider range of models. Briefly the initial agroforestry model combined a 0.4 ha irrigated home lot with three hectares of managed forest and wage labor in the forest industry. That forest industry might be in the form of a joint venture with resettler outgrowers associated with a nuclear estate and processing facilities or with a less structured relationship with an unlimited number of potential buyers. In either case, the forestry component was expected to provide up to 70 percent of resettler household income. The Panel questions the viability of such a model for several reasons. First, it requires resettlers to participate in a new form of livelihood not of their own choosing. Second, it significantly reduces the extent to which they produce their own food. Third it shifts their current dependence on the natural environment through agriculture and various natural resource utilization activities to dependence on a commercial enterprise over which they have little control.

Far more desirable is another model under current consideration on NTEC's experimental

and demonstration farm. The farm was initiated late in 1996 and recently three households have been selected to test and demonstrate the proposed model. That model attempts to improve upon and stabilize the diversified system of household production that appears to have provided villagers with self-sufficiency in the years before the war. That system was centered around paddy and swidden cultivation, livestock management, gathering, fishing and hunting activities. Anticipating resettlement close to the full storage level along the southwestern border of the reservoir, the model combines the irrigated 0.4 hectare home plot with paddy field cultivation, three hectares of forest land, utilization of the reservoir drawdown area for flood recession agriculture and grazing, fishing, handicrafts and wage labor. Swidden cultivation will be phased out in accordance with national policy.

The Panel believes this model has potential provided it is not intensified to the extent that lack of household labor becomes a major constraint. It has several major advantages over the agroforestry model. First, it includes the resettlers' two development priorities which are paddy fields and livestock. Second, it makes use of the Nam Theun 2 reservoir's extensive drawdown area. Throughout the tropics the drawdown area of reservoirs tends to be ignored by planners as a development resource in spite of its potential for flood recession agriculture, grazing, and small weirs across annually flooded inlets for fish farming. That potential is especially great in connection with the Nam Theun 2 reservoir.

As noted in Annex 3-5, at full supply level the surface area of the reservoir will cover 450 square km versus 164 square km at minimum operating level. As a result annually, a large drawdown area (286 square km in size between those levels) will be made available. The upper three meters can be utilized, on the average, for 8 months, November-June, while approximately 100 sq km will not be inundated for more than four months according to NTEC -- more than enough time for the maturation of fodder resources. Annex 3-6, 3-7, 3-8 and 3-9 illustrate this potential in four areas of the reservoir where resettler villages have stated a desire to relocate. Scale is 1/20,000, each square being 4 square kilometers. Because of the gradual gradient of the reservoir margin, three meters of drawdown translates into a considerable hectareage.

During planning the drawdown area should be carefully zoned for different uses around each resettled village not just to increase potential but also to reduce conflicts between those who wish to use the land for grazing and those who wish to use it for agriculture. Furthermore, if people are resettled in social units of their own choice (as required by World Bank guidelines), quite possibly some existing villages may wish to fission which will better distribute them around the available margin of the reservoir.

4.2 Other Project Affected People

4.2.1 The NNT- NBCA

4.2.1.1 The Existing Situation

In the opinion of the Panel combining conservation and development in the NNT

NBCA is likely to be the most difficult task faced by the project. The analysis that follows is predicated on the possibility that the problems discussed cannot be solved.

Current population estimates in the NBCA range from approximately 5,500 to 7,000. What evidence the Panel has is contained in Annex 4-1 that contains information on the indigenous people of the NNT- NBCA. Several characteristics warrant mentioning. First, the entire population is composed of indigenous people. Though belonging to the same ethnic groups as the Nakai Plateau population, they tend, as a whole, to be more isolated not just from the plateau and the lowlands but also from each other. Second, as shown in Annex 4-2 their distribution is along five tributaries of the Nam Theun as well as along the upper portion of the Nam Theun itself. Subdistrict centers are located on three of those rivers; the Nam Mon, Nam Theun and Nam Noy respectively. Third, as illustrated by both Annex 4-1 and 4-3, their production system at the household level is quite diversified. Crop agriculture is supported by swidden cultivation, and in some cases by banded and terraced paddy fields. Cash income is provided by fish, forest products, wildlife and livestock.

As with the resettler population on the plateau, in recent years this household economy has not been able to meet the people's basic food needs. As a result they have had to exploit to a greater extent forest products and wildlife, with an adverse effect on the biodiversity of the latter. More information is needed on the causes for this recent deterioration in living standards. Expected reasons include residual effects of the war, increased flooding and pest predation of crop land, and population increase. The Panel was told that pest predation has become particularly serious during the past three years. One village was visited in which the entire rice crop was said to have been destroyed by rats. Mention was also made of major insect damage. In both cases, reduction of small carnivorous mammals and of birds would appear to be involved. Though population increase can be expected to be a major problem in the future as government services improve, currently rates of increase are said to be well below the national average of 2.6 percent per annum. There also appears to be little current immigration; indeed, some mention was made of outmigration to the plateau which is to be expected as some households seek closer contact with roads and development centers.

Because of food deficits, for the past five years GOL has been involved in an expensive program of providing famine relief by helicopter to the area. To reduce such expenses and to facilitate the provision of government services designed to raise living standards, GOL approved the construction of a road through the area in the early 1990s. Starting from the Lak Sao road in the northwest corner, that road would link up the three subdistrict centers (which now provide no services besides the odd teacher) with the existing road system to the southeast.

At the request of the WB a moratorium was placed on road construction in late 1996 pending the completion in the middle of 1997 of a NBCA management plan. The intention of the government, however, is eventually to complete that road as well as to continue a process of village consolidation to aggregate the NBCA population within a smaller number of settlements.

4.2.1.2 The Panel's Assessment

Until current, and probably further, studies have been completed, it would be unwise to conclude whether conservation and development goals for the area are or are not compatible. The comments that follow are intended to suggest ways in which conservation and development goals might be linked successfully in ways that do not violate GOL policies and WB guidelines.

(1) Every effort should be made to stabilize existing settlements within their current habitat rather than to consolidate them within a smaller number of settlements. Though tempting for provision of improved social services and administrative convenience, village consolidation has seldom proved sustainable for both economic and socio-cultural reasons. Furthermore, such consolidation is not acceptable according to WB guidelines.

The Panel believes that there are a number of ways for approaching the stabilization issue. They could include the following:

- a. restricting further extension of agriculture and settlement within the upper Nam Theun and all tributary river basins.
- b. restricting immigration into the area. Though some slippage here is inevitable due, for example, to relatives joining existing families, the current system whereby people must obtain both an exit permit to leave a village and an entry permit to settle in another should facilitate compliance.
- c. intensifying existing systems of land use. Some Sek communities, for example, have terraced paddy fields as does one Brou village which took over the terraces vacated by Sek people when they moved back to their former village after the end of the war. Extending such terracing within villages as well as to other communities could play a major stabilizing role. The same applies to the way in which the Sek apply manure to their fields. Small scale irrigation projects could also play an important role by adding a second annual cropping season.
- d. Designing the road so that bridges and culverts will allow the passage of two-wheel tractors with trailers but not larger vehicles.
- e. encouraging fewer and better spacing of children. Already with government approval and involving the Lao Women's Union, this activity should be extended to the NBCA area as part of any program to improve medical services.
- g. decentralization of control over land and natural resources to the community and household level as intended under the draft Land Law that will receive further consideration during 1997 by the General Assembly.

(2) Development of adjacent and other areas to which some existing NBCA villagers might wish to move. While such movement must be voluntary as stipulated in WB guidelines, it could play a major role in population stabilization. A first step would be to ascertain areas to which NBCA residents are already moving and the reasons for such movement. Another step would be to discuss with the people areas to which they might wish to move if appropriate economic opportunities and services were available. What those opportunities need be would have to be

ascertained. Presumably they would include paddy, possible double cropping of that land, potential for livestock, education for children and medical services. During the Panel's visit two possible areas were mentioned, though not by NBCA villagers. One was the lower Xot River Basin within and adjacent to the NBCA where there apparently is considerable potential for developing additional paddy land. In that case, the portion of the area within the extreme southwestern corner of the NNT-NBCA might be excised.

The second area was the 4B resettlement area (Annex 4) at the base of the Plateau in Gnonmalath District. Though set aside for plateau resettlers, to date none have stated a desire to move there. That might also be the case with NBCA residents. However, presumably one reason why Plateau residents were not interested in the area is that the necessary irrigation system would not be in place at the time of their required movement since water would not be available until the power station was operational. Once such an irrigation system was in place, however, along with other services, some NBCA villagers might wish to move there. Comprising approximately two-thirds of the NBCA population and with a former history of paddy cultivation, Brou might be particularly interested since there are already Brou communities adjacent to the 4B area. We would emphasize, however, that if such a move is to be successful it will require assuring that outsiders do not immigrate into the 4B area before the Brou from the NNT-NBCA.

Throughout this discussion the Panel has used the words "wish to move" as opposed to the words "willing to move." Outmigration from the area must be on a completely voluntary basis, with individual households making household decisions one way or the other. Such movement should be carefully monitored by an external agency since there is always the risk of over-zealous government agents "twisting the arms" of villagers to take advantage of opportunities that the government sees but which may be differently seen by the people.

The development of potential outmigration areas would be a long-term process lasting for at least two generations. It therefore would be an appropriate activity for the Nam Theun Social and Environmental Project (NTSEP) that is currently under consideration by a World Bank Preparation Mission. Since most, if not all, such areas would contain host populations, those populations should be incorporated into whatever development plans are forthcoming.

4.2.1.3 Education and Institution Building

The basic problem in the NNT-NBCA is how to link the people's development with conservation in a sustainable way. By sustainable, the Panel includes institutional and cultural sustainability along with environmental and economic sustainability, hence the need for culturally relevant community institutions for natural resource management that are passed on from one generation to the next. Effective watershed and NBCA management requires active popular participation in planning, implementing and monitoring. Achieving such participation on a community level can be expected to require many years of education and institution building. Some communities in the NBCA are relatively homogeneous. That makes education and institution building easier though time is still required. However all communities are changing --

becoming more complex, more stratified; with different households having different interests as the Panel found in the Sek village visited. Those characteristics make participation at the community level more difficult.

Education is crucial for both adults and children. In regard to children Mr. Cheng's BPKP ethnic school at Lak Sao could play an important role if an appropriate curriculum was devised and a critical mass of children educated from the NBCA area. But linking people into groups that practice natural resource management requires institution building. The international experience is that nongovernmental organizations (NGOs) have been more effective than government agencies in helping ethnic minorities build the necessary institutions. The whole process can be expected to take over ten years; hence another potential activity for NTSEP. There is the need for involvement on both local and international NGOs. The lack of local NGOs in the Lao PDR is a matter of concern that should be promptly addressed.

4.2.1.4 Possible "Gatekeeping" Villages along the Northern Shore of the Reservoir

Currently opinions vary among those to whom the POE talked as to the advantages and disadvantages of allowing some of the 22 villages to relocate along the northern shore of the reservoir if they so desire. At the moment four villages have stated such an initial preference. One is located at the upper end of the reservoir within the area shown in Annex 3-9. The other three are relatively close to the Lak Sao road toward the lower end of the reservoir. They contain a more heterogeneous population including more recent immigrants and hence might be more difficult to involve within a community natural resource management and "gatekeeper" strategy that the upper reservoir village which has a much longer association with the area. The Panel recommends that this option be carefully studied, such a study being a good way to forge more cooperation between the resettlement planners and the IUCN/WCS team. Should studies lead to a pilot project, that might initially be funded through the World Bank-administered Japanese aid until the NTSEP project came on line.

4.2.2 The 38 Kilometer Transbasin Canal

Especially at its upper end, the canal will cross the paddy fields of a community irrigation project as well as the paddy fields of other villages. Current estimates are that 30-60 hectares may be taken out of production. Size and ownership of such land cannot be determined until a final decision is made as to canal routing and type of construction. Judging from field size as determined by bunding, several hundred families might be involved. In that case, ensuring that they become project beneficiaries will require either intensification of production on existing land through double cropping, or provision of newly created and irrigated land through the use of canal waters. Even where a small portion of a paddy field is required for project purposes, cash compensation is not an acceptable solution.

4.3 Benchmark Pre-Resettlement and Pre-Development Research

In order to know when living standards have improved, it is important to complete comprehensive benchmark studies before resettlement (and in the case of the NNT-NBCA, development) begins. One of the greatest weaknesses of previous projects throughout the world is the failure to complete appropriate epidemiological, socio-economic and cultural studies of the local population before projects get under way. While NTEC has initiated a wide variety of short term studies, there is a major need for longer, more research-oriented benchmark studies such as those undertaken by students and faculty at academic institutions. As with biodiversity research, the Panel recommends that consideration be given to forming linkages with universities and research institutions in other countries who can provide faculty and students to work with local researchers in carrying out studies that last throughout a complete annual cycle. Funds for such research should not be difficult to access. In connection with the Aswan High Dam, for example, the Ford Foundation not only funded a comprehensive socio-economic and ethnographic study of the resettler population but also funding for at least six Egyptian students to obtain overseas PhD degrees in social science fields. In the case of the Lao PDR, the Panel was informed that a Japanese grant that will be administered through the World Bank starting this year (1997) might be one source of such funds. As for academic affiliation, the Panel understands that discussions may have already begun with the University of Munster in Germany for assisting in a comprehensive sociological survey of Laos. Should such a survey materialize certainly the NNT2 NCBA and the Nakai Plateau should be included.

4.4 Monitoring

The monitoring of resettlement impacts should commence during the year following removal. Within the NBCA monitoring should commence during the year following the commencement of development activities. Monitoring of impacts of canal construction on adjacent communities, and of whatever development activities are initiated, should also commence during the year following completion of each section.

For policy-relevant research, it is neither feasible nor practical to monitor each household affected. Rather from the more inclusive benchmark surveys a relatively small, but carefully stratified, sample of households should be selected. Such a sample should be stratified geographically (e.g., according to village location), and ethnically, as well as according to living standards and access to labor and resources. Special attention should be paid to the poorer households, including female-headed households.

Household questionnaires should include a number of relatively simple indices, such as quality and maintenance of housing; household furnishings; cooking, heating and lighting; water supply and waste disposal; and productive assets which will allow interviewers to assess at the time of the interview whether living standards are improving, remaining the same, or dropping. So as to reduce the need for two separate monitoring activities, appropriate public health criteria should also be included. To check data and observations such interviews should be followed by open-ended group interviews that involve neighbors and fellow villagers.

Ideally interviews should be completed twice annually, with one at harvest time and the other during the most frequently occurring period of seasonal hunger. The same months should be selected each year, with perhaps 50 to 100 households selected on the plateau, an equal number in the NBCA and no more than fifty along the canal. While those numbers may seem inadequate to statistically minded readers, the purpose of the monitoring is not to provide data for research papers but to allow officials to identify and act upon positive and negative impacts as they occur.

Such monitoring should be done outside of the NNT2 family of development agencies. Ideally it should be done by a local university, NGO or council of NGOs, or social science research institution. If such institutions need strengthening then affiliation with a relevant university or research institution could be arranged so that local monitors will have the opportunity to work with more experienced colleagues. In Laos whatever arrangements are made for completing the necessary benchmark studies could also be adapted to meet monitoring needs.

5. Impact of Construction and of Project-Related Immigrants

When major construction activities, particularly the dam, power plant, tunnel, canal and roads start there will be the potential for substantial direct environmental impacts. These can be minimized by careful management. More pervasive impacts, particularly on the biodiversity, are expected from the influx of project-related immigrants, and at this stage the Panel has given most attention to that issue.

In the much smaller Nam Hinboun dam the original EIA study concluded that "there are no significant adverse sociological impacts as no resettlement is required" (Norpower, 1993). Subsequently supplementary studies have shown that up to 5,885 people could be affected by reduced fishery production at the damsite and another 3,327 from increased flooding in the Nam Hinboun valley. In addition, shifting cultivation has spread rapidly along the access roads to the dam and adit shaft sites, and the construction township has also become a significant additional market for hunted wildlife (Marsh, 1996). The construction township with some cultivation reportedly grew much more rapidly than was anticipated, largely in an unplanned way, and it now covers a substantial area.

These problems would be particularly serious if repeated at the NT2 dam site because it is located in the proposed Corridor extension which links the NNT-NBCA and the Kammouane Limestone NBCA, and the corridor is quite narrow at that point. Any permanent settlement there would compromise the effectiveness of the Corridor, as would a large and unregulated construction town, even if it was only relatively temporary. Consequently, any construction township should be carefully planned in advance, with strictly followed regulations regarding size, area involved, and prohibition of cultivation and hunting, and means to implement the regulations.

NTEC personnel said that they expected about nine construction camps in addition to the

one at the dam site, although several of them will be somewhat mobile for road and transmission line construction. The environmental impacts of construction camps can be expected at these other camps, but except for those involved with road construction, the biodiversity significance is expected to be less since these areas are already significantly impacted by human activity and have substantially reduced biodiversity.

As already mentioned, immigrants tend to be the main beneficiaries among project-affected people. At this date this is already the case with the NT2 project since most of the logging crews are composed of immigrants including workers from Vietnam, while most of the commercial businesses in the Nakai District Headquarters on the plateau appear to be run by people from the lowlands. The same can be expected to be the case once the NT2 dam construction process starts in part because most of the local people will be busy with resettlement activities and in part because most do not have the necessary skills. Even though NT2 is a national project, the Panel commends the GOL and NTEC policy that local people will be given employment preference for suitable positions. The panel recommends that NTEC consider what positions can be filled locally if short training courses (several weeks to several months) are offered.

The employment issues involved are important. During and since the war, plateau villagers have seen their herds depleted. Wage employment would provide a most valuable means for rebuilding those herds and hence for increasing the odds for the resettlement program to improve their living standards.

Reservoir fisheries is another area in which immigrants tend to outcompete local people unless appropriate policies are implemented. Such policies include training courses in reservoir-appropriate fishing gear and techniques, availability of equipment and credit for its purchase, and initial restriction of reservoir fishing to resettlers.

Though most will be temporary residents, the largest number of immigrants will be the construction labor force and the thousands of individuals with or without their families who will come to provide informal sector services. Their presence will have a major impact socially and environmentally. The relatively much smaller Nam Hinboun Dam, some 60 km downstream on the Nam Theun River from the NT2 damsite, has a workforce of some 2,000 while associated informal sector immigrants raise the immigrant population to over 8,000 persons. Substantially larger, with more construction sites, the NT2 Project will have a larger workforce and attendant temporary population.

Three sites will be on the plateau. They will be located at the dam site, the hydropower site and at a quarry site along the Lak Sao Road some 25 km north of the dam site. Below the Nakai Plateau a large construction site will be located at the hydropower tunnel outlet. Laborers there will also work on the canal, the construction of which will require a further site for workers toward the bottom end. As for the 147 km transmission line to Thailand, that will involve three camps of approximately 100 workers each that will move monthly as construction proceeds.

Proximity of the three plateau construction camps to local villages will depend on the future location of resettlement sites. While most resettlers will be located at a significant distance from those sites, that will not be the case along the canal nor along the transmission lines. There close contact between construction workers and villagers can be expected to have negative public health and social impacts on the latter. Regardless of mitigation measures implemented, those impacts can be expected to offset whatever economic advantages, such as employment and informal sector activities, accrue to villagers during the construction phase. That is because of increased exposure to sexually transmitted diseases (especially HIV infection leading to AIDS). The POE agrees with the Macdonald Report (WB, 1996b) that AIDS, along with malaria, present the main public health problems both of which must be taken seriously. But social problems, leading to conflict within villages and conflict and divorce within families can also be expected. Both sets of problems will be exacerbated should some families be allowed to incorporate workers within their village by renting out accommodations

NTEC's turnkey contractor is well aware of the need to provide appropriate sites and services for both the labor force and the providers of informal sector activities. As with the Nam Hinboun school wherever possible, construction camp facilities should be built with further development considerations in mind. One of the more unfortunate characteristics of river basin development projects is for contractors to build their facilities as if they existed in a vacuum. In siting housing and other facilities for laborers, and in laying out areas for the informal sector community, future area development needs should be kept in mind for the time when the construction phase ends. Hence the siting and servicing of the informal sector areas should consider the extent to which those areas could subsequently evolve into permanent or periodic market sites.

For reasons already mentioned, labor and informal sector sites should be isolated to the extent possible from resident villages. At the very minimum informal sector sites should have water, sanitation and electricity as well as an area into which to expand should the influx of outsiders initially be underestimated. Proximity to the labor camps is also desirable to increase the cost effectiveness of facilities such as clinics which could serve future regional development needs.

6. Continuing Activities of the Panel

The Panel members consider that it would make best use of their time if the reports currently being researched and written were sent to them at their home institutions as soon as published. They would then communicate with themselves, GOL and the WB by phone, fax and e-mail before .

There are some issues on which the POE may feel it has insufficient expertise, on which data are urgently required, and it would like to be able to employ experts for short periods.

The Panel also recommends that its reports be made public without undue delay after review by

GOL and the WB.

6.1 Provisional 1997 Timetable

Spring, Early Summer	Receive and review reports as prepared, and possibly meet with the WB Advisory Committee.
July 20-26	1 week visit to Laos.
August - November	Panel is available for consultation with WB in connection with its pre-appraisal and appraisal missions.
December, 1997/January 1998	2-3 week visit to Laos.

The map illustrates the Nakai-Nam Theun Conservation and Protected Forest Area in Laos. Key features include:

- Geographical Context:** The area is situated in northern Laos, bordered by Thailand to the west and Vietnam to the east. The Mekong River flows along the western boundary.
- Infrastructure:** A transmission line runs from the forest area southwards, with an arrow indicating "ELECTRICITY TO THAILAND". A new road, labeled "NEW ROAD BB", is shown passing through the area.
- Key Locations and Features:**
 - DAM:** Located at the northern end of the forest area.
 - RESERVOIR:** Situated just south of the dam.
 - POWERHOUSE:** Located further south, near the downstream waterway.
 - DOWNSTREAM WATERWAY:** A channel leading from the powerhouse.
 - Gnommalath:** A location near the downstream waterway.
 - Nakai:** A location within the forest area.
 - Thakhek:** A town located south of the forest area.
 - Mahaxai:** A town located east of Thakhek.
 - Xe Bangfai:** A river or channel flowing through the region.
 - Savannakhet:** A city located further south in Laos.
- Map Details:**
 - Scale:** A scale bar indicates distances up to 20 km.
 - Compass:** A north arrow is provided.
 - Legend:**
 - NATIONAL HIGHWAYS (solid line with a circle)
 - RIVER / CHANNEL (wavy line)
 - DISTRICT CENTRE (small square)
 - INTERNATIONAL BOUNDARY (dashed line)
 - PROVINCIAL BOUNDARY (dotted line)
 - NECA BOUNDARY (long-dashed line)
 - NAKAI PLATEAU BOUNDARY (short-dashed line)

Annex 1. POE Terms of Reference

FEB 05 '97 04:52PM WB EA:IE 202 4772743
 From : TAI PAN HOTEL VIENTIANE LAO PHONE NO. : 856 21 216222

Feb. 03 1997 B:4

Panel of Environmental and Social Experts Terms of Reference

1. The requirement for a panel of experts (POE) on complex or contentious projects is stated in the Bank's Operational Directive (OD) 4.01, "Environmental Assessment". The POE's primary objective is to provide independent review of and guidance on the treatment of environmental and social issues associated with a project under preparation. The POE's purview is comprehensive; it extends to project siting, design, and plans for construction and operation, mitigation and monitoring plans, resettlement action plans, and plans for indigenous peoples. The POE's findings and recommendations are submitted directly to the Bank and the Borrower.
2. Besides OD 4.01, the POE will find more detailed guidance on its functions in the Bank's OD 4.00 Annex B, "Environmental Aspects of Dam and Reservoir Projects". This directs that the panel should review projects to ensure that adequate environmental standards are being applied and assist with developing Terms of Reference for work programs to remedy deficiencies or fill data gaps. Ideally the panel should begin its work before the scope of the environmental assessment is determined. The panel would then normally assist with the screening process and agree on a scope of work for the EA. In this case, the first tasks of the panel are to ensure that the next version of the environmental assessment (EA) report fully meets international standards and, because it is being prepared separately from the EA, to review the Terms of Reference and Inception Report of the Analysis of Alternatives.
3. The POE is free to make its own determination as to which environmental issues it should focus on. The Bank would suggest that it direct its attention initially to the following:
 - impacts on terrestrial biodiversity and plans for compensation and mitigation,
 - the design of the Nakai-Nam Theun Biodiversity Conservation Area (NNT NBCA), recommendations for its extension, and the plans being developed to manage it;
 - downstream impacts on water quality and flow regimes;
 - impacts on aquatic biodiversity and subsistence and commercial fishery, together with management and monitoring plans; and
 - impacts on globally threatened or rare species, terrestrial or aquatic.
4. For social issues, the POE will review issues of resettlement, indigenous peoples, and public health, and plans to address them, and if necessary, recommend changes in project design to comply with the Bank's Operational Directives 4.20, "Indigenous Peoples" and 4.30, "Involuntary Resettlement". The Analysis of Alternatives includes social factors which the POE should also examine.

5. *Resettlement.* The POE will assess whether resettlement has been minimized; whether sufficient work has been undertaken on restoration of incomes and living standards of the affected population; and review the timetable, budget and institutional capacity to implement resettlement.
6. *Indigenous Peoples.* The POE will determine whether indigenous peoples have security of tenure over forests and forest products, whether the management plans are culturally appropriate, if cultural heritage requires protection and establish that consultation has taken place.
7. *Public Health.* The POE should Review measures to protect and improve the health of affected populations in the catchment area, the reservoir area and the downstream area, as well as screening of the immigrant workforce/camp followers and make recommendations as appropriate.
8. The POE should also determine whether the project design and implementation plan has anticipated and adequately provided for other impacts that are both social and environmental, such as effects on cultural property or traditional customs, the "boom and bust" phenomena often associated with large projects in undeveloped areas, interaction between local populations and imported labor force, and developments induced by the project.
9. The POE will meet three times in its first year of operation and twice annually thereafter. The initial meeting will include an extended field visit. Other visits to the project area will be arranged at the POE's request. Panel members will be supplied with complete sets of documents to digest before leaving home and will be briefed in Vientiane before the first field visit. The POE normally visits the greater project area and the project proponents for a week or two, until the members become familiar with the many different components of the project. After each meeting, the POE leaves a signed copy of its findings and recommendations advice with the borrower before departure. The POE's report, together with the borrower's response, is forwarded to the Bank promptly thereafter.
10. The POE for this project should consist of no fewer than three individuals, who should be world leaders in their respective fields. One panelist should be an environmental generalist thoroughly versed on environment/development tradeoffs, and one should be versed in wildlife or protected area management. The third would comprise a social scientist with experience in resettlement and indigenous peoples in South East Asia. The budget for the panel will allow for temporary additions to the panel to provide supplementary expertise as required. In this instance, one could foresee a need for assistance from experts in hydrology (unless available from the Dam Safety Panel that is also being formed), limnology and aquatic ecology, and parasitology or malacology, and the POE may identify other special purpose requirements.

**Annex 2. POE Schedule, Meetings and Itinerary
January 24 - February 8, 1997**

**Tentative schedule for POE
from 4/1/1997-8/2/1997**

24.01.97

- 11:40 POE arrive Vientiane Airport by TG 609 and transferred to Royal Hotel
- 14:00 Meeting with H.E. Soulivong Daravong, Minister for Industry and Handicrafts
- 14:45 Courtesy visit with Prof. Dr. Souli Nanthavong, STENO President
- 15:30 Briefing meeting with H.E. Noulinh Sinbandit, STENO Vice President

16:30 Briefing meeting with Dr David Iverach, NTEC EMT Director

25.01.97

- 7:15 Check in at Wattay at Westcoast terminal.
- 7:30 Take off and flight to Laksao. Overflight Nam Ngum reservoir and South-eastern Nam Ngum Catchment area, heading to Pakkading and follow up Nam Kading to Theun Hinboun Dam site.
- 9:00 Land Laksao and refuel.
- 9:30 Take off and overflight to Conservation and Protection Forest Areas.
- 12:30 Lunch at Nakai.
- 13:30 Take off and overflight:
 - damsite areas. Downstream area, Xe Bang Fai
 - Fly to Thakhek.
 - Diner at BPKP Hotel

26.01.97

- 7:00 Breakfast.
- 8:00 Nam Malou, Thalang and NBCA
- 11:00 Meet Mr Cheng, BPKP President on Workshop
- 12:30 Lunch at Laksao
- 14:00 Back to Vientiane.
- 19:00 Arrive Vientiane and transfer to Dokmaideng Hotel.

27.01.97

- Attend workshop on PCPP
- Meeting with GOL officials. *(RC Pres.)*
- Documentation review

28.01.97

- Documentation review
- Meeting with GOL officials *(on request)*

29.01.97

- Attend workshop on PCPP (full day)
- Meeting with GOL officials. *(on request)*
- Documentation review

30.01.97

- 8.30 Departure to Thakhek
- 12.30 Arrive Thakhek, transfer to Hotel and Lunch
- 14.00 Briefing on Resettlement Plan by NTEC
- 16.00 Meeting with Khammouane Governor or Deputy Governor
- 17.30 Baci ceremony
- 18.30 Diner hosted by Provincial Administration

31.01.97

- 8.30 Departure to Ngommalat.
 - Adit (Powerhouse site)
 - Small irrigation scheme
 - resettlement sites 4
- 12.30 Lunch at Mahaxai
 - Boat trip upstream Xebangfai to Nam Phit mouth.
 - Overnight at Mahaxai Guest House.

01.02.97

- 7.30 Departure to Nakai
- 8.15 Arrive Nakai
 - Visit Resettlement sites 1,2,3 and Ban Nakai Tai, Nakai Neua, Thalang
 - visit Nam Malou (Nam Nialong) area
- 17.30 Return to Nakai and overnight at Nakai Guest house.

02.02.97

- 7.30 Departure to Ban Done (one hour drive)
- 8.30 Boat trip from Ban Done, Nam One to Namtheun and to Thalang with stop over
 - Ban Phonsavang
 - Ban Keng Gnao
 - Ban Sop Ma
 - Ban Sop Phene
- 14.00 Travel by car from Thalang to Laksao with stop over at Ban Sop Hia (Dam Site)
- 16.30 Depart from Ban Sop Hia to Laksao with stop over Ban Thongsengkamat (resettlement villages for Hmong people sponsored by GOL implemented by BPKP)
- 18.00 Arrive Laksao and overnight Laksao

03.02.97 (Flight Journey)

7.30 Take off from Laksao and overfly catchment area, possibly land

- Ban Navang on Nam Xoi valley or
- Ban Teung on Nam Mone valley or
- Ban Thaphaiban on Nam Theun upstream valley
- Thong pe grazing 'island' in the heart of jungle, southeastern of catchment area

16.00 Return to Laksao

04.02.97

7.30 Take off and overflight:

- Corridor
- extension area to NBCA

12.00 Land at Laksao and lunch

16.00 Meeting Chairman BPKP, Mr Cheng Sayavong

17.30 Hot spring bath at Nape (30 minutes drive from Laksao)

19.30 Diner

05.02.97

6.30 Breakfast

7.30-15.00 Workshop (See attached Agenda)

16.00 Departure from Lak Sao by car

21.00 Arrive Vientiane

06.02.97

8.30 Meet H.E Soulivong Daravong, Minister for Industry and Handicraft

9.30 Report write up completion

07.02.97

14.30 Debriefing STENO-HPO-NTEC at STENO Office

08.02.97

Free in morning

11.00 Check out

Annex 3. Information on the Resettler Population

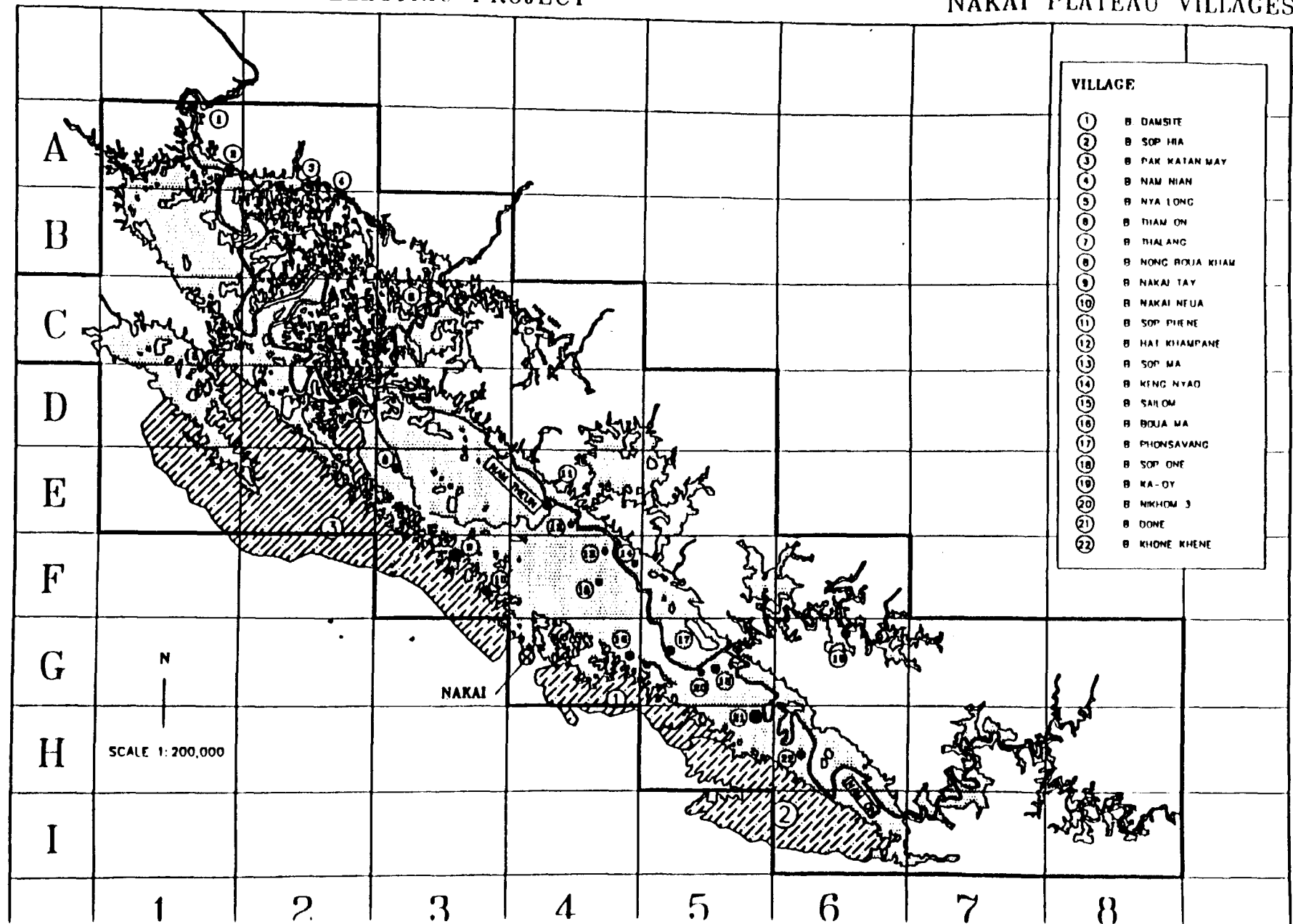
COMMUNITIES OF THE NAKAI PLATEAU IN THE 1 THEUN 2 RESETTLEMENT PROGRAM (as of Feb. 1996)

Villages by Ethnicity, Elevation, and Population								Income and Livelihood			
	Name of Village or Settlement	Major Ethnic Group	Est. Elevation in metres above sea level	Approx. % of Village Inundated at FSL (538 masl)	Total HHs	Total Village Pop.	Ave HH Size	Ave HH Cash Inc. (000's Kips)	Ave HH Imputed Inc. (000's Kips)	Ave HH Total Inc. (000's Kips)	Main Sources of Income
	Oudomsouk (Nakai District Town)*	N/A	533 - 550	20	167	845	5.1	N/A	N/A	N/A	N/A
1	Dam Site (incl. w/ Sop Hia)	-	515 - 525	100	-	-	-	-	-	-	-
2	Sop Hia	Vietic	515 - 530	100	51	261	5.1	293	169	462	Forest products, Wildlife
3	Pak Katan May (incl. w/ Sop Hia)	-	N/A	N/A	-	-	-	-	-	-	-
4	Nam Nian	N/A	525 - 530	100	24	122	5.1	100	149	249	Rice, Wildlife
5	Nya Long (admin. by Thalang)	N/A	520 - 525	100	4	28	7.0	168	253	421	Rice, Forest products
6	Tham On (admin. by Thalang)	Bo	525 - 530	100	12	68	5.7	325	362	687	Rice, Ag & Livestock
7	Thalang	N/A	525 - 538	100	37	156	4.2	858	381	1,239	Forest products, Rice
8	Nong Boua Kham	N/A	525 - 545	65	41	285	7.0	702	90	792	Wages
9	Nakai Tay	Bo	530 - 547	35	130	608	4.7	143	215	358	Rice, Ag & Livestock
10	Nakai Neua	Bo	530 - 547	65	58	272	4.7	140	159	299	Rice, Ag & Livestock
11	Sop Phene	Bo	525 - 533	100	40	170	4.3	240	147	387	Forest products, Rice
12	Hat Khamphane (incl. w/ Sop Ma)	-	525	100	-	-	-	-	-	-	-
13	Sop Ma	Bo	527	100	34	163	4.8	244	298	542	Rice, Forest products
14	Keng Nyao (incl. w/ Sop Ma)	-	525 - 532	100	-	-	-	-	-	-	-
15	Sailom	Brou	529 - 533	100	40	185	4.6	174	227	401	Rice, Fish
16	Boua Ma	Brou	525 - 535	100	39	214	5.5	305	196	501	Ag & Livestock, Rice
17	Phonsavang	Brou	530 - 535	100	29	163	5.6	211	220	431	Rice, Forest products
18	Sop One	Brou	528 - 531	100	58	328	5.7	180	308	488	Fish, Rice, Wildlife
19	Ka-Oy	Brou	525 - 540	80	23	132	5.7	92	209	301	Rice, Fish
20	Nikhom 3	N/A	525 - 530	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
21	Done	Brou	525 - 528	100	87	602	6.9	246	151	397	Ag & Livestock, Rice
22	Khone Khene	Brou	525 - 529	100	38	192	5.3	125	137	262	Rice, Ag & Livestock
TOTALS and AVERAGES					910	4794	5.3	258	205	461	

- NOTES:
- The numbers in the first column denote the numbers of the villages/settlements on the "Village Map"
 - All figures are from NT2 socio-economic and cultural survey by CARE International, except figures for *Nakai District Town, which was not included in the survey. The figures for Nakai District Town were provided by provincial authorities
 - The major ethnic groups on the Nakai Plateau have sub-groups represented as follows: Bo ethnic group has no sub-groups; Katuic ethnic group has only the Brou sub-group; Vietic ethnic group has the Ahoe, Krii, and Phong-3 sub-groups; Tai-Kadal ethnic group has the Kaleung, Sek, Moey, Theng, Phou Thay, Mene, Phong Kouen and Nyo sub-groups dispersed in small numbers in several villages across the Nakai Plateau
 - These statistics are subject to change as people move from one village to another (eg Boua Ma to BPKP village and back), establish new villages (Dam Site), and vacate others (Nikhom 3)
 - The provincial authorities recognise 17 village administrative units
 - The CARE survey identified 21 communities. This excluded Nikhom 3 as there were no families living there, but it is still officially a "village administrative unit"
 - Not all villages/communities will be resettled, but they are in the resettlement program

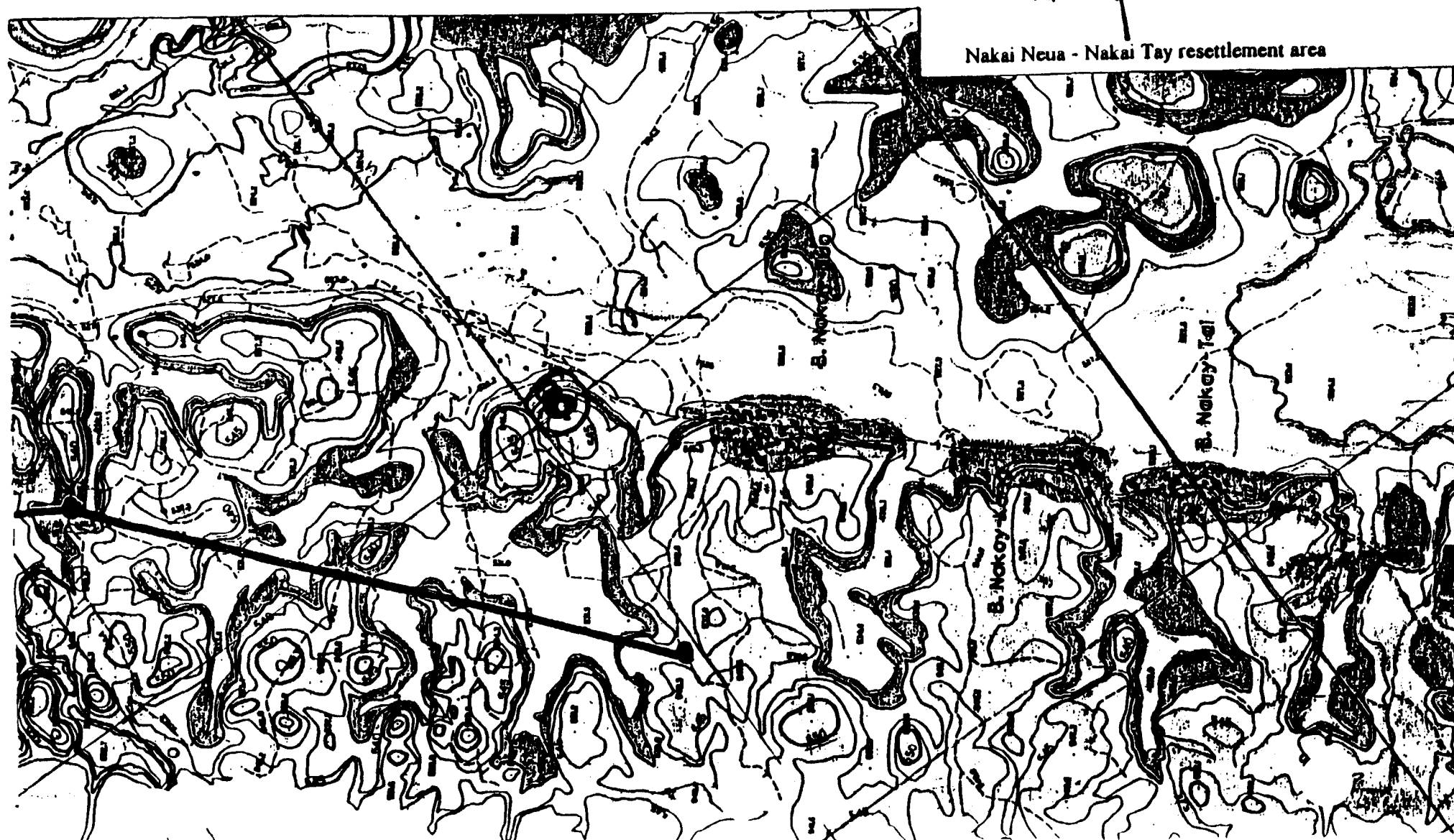
NAM THEUN 2 HYDROELECTRIC PROJECT

NAKAI PLATEAU VILLAGES



CONTAINMENT OF DRAWDOWN AREAS

Pink area is top 3 metres of drawdown (average exposure 8 months, Nov-June)



Pink area is top 3 metres of drawdown (average exposure 8 months, Nov-June)

Nam Malou area



6.2.14	A/3 - CPAWM - 1: Location of Villages in NNT NBCA - Map 1 Ref 1.2 Colour - (See Ref 2.3)								
6.2.15	A/3 - CPAWM - 2: Village Areas Claimed by Village Committees - Colour - (See Ref 2.3)								
6.2.16	A/3 - CPAWM - 3: Infrastructure and Supporting Facilities in NBCA - Colour - (See Ref 2.3)								
6.2.18	A/3 - CPAWM - 4: Rice Deficiency Areas in NBCA - Colour - (See Ref 2.3)								
6.2.19	A/3 - CPAWM - 5: Main Hunting Grounds Used by Villages in NBCA - Colour - (See Ref 2.3)								
6.2.20	A/3 - CPAWM - 6: Main Areas for Gathering of Forest Products in NBCA - Colour - (See Ref 2.3)								
6.2.21	A/3 - Downstream Channel - Vegetation and Land Use Map - Colour - NTEC Version								
6.2.22	A/3 - Index to 1: 25.000 Topographic Maps with 17 Sheets Needed for NT2 Reservoir Noted - B/W Maps for NT2 according to NTEC Index include No s. 6, 7, 10, 11, 18, 19, 20, 27, 28, 29, 30, 30, 31, 32, 35, 36, 37 & 38								
7.	Resettlement Planning and Program	1	2	3	4	5	6	7	
7.1	CARE (1996) - Socioeconomic and Cultural Survey - NT2 Project Area - (See Ref 2.4)	x	x	x	x		x	R	
7.2	Burnside (1996) - Land Capability Study of Resettlement Sites - NT2 Project	x					x	S	
	Steidel (1996) - Preliminary Irrigation Capability of Downstream Areas						x	R	
7.4	WB (1996b) - WB Mission - NT2 Project Aide Memoire - Background Paper on Resettlement						x	N	
7.5	WB (1996b) - WB Mission - NT2 Project Aide Memoire - Background Paper on Public Health			x			x	N	
7.6	IMPE (1996) - Additional Study on Public Health of NT2 Project-						x	R	
7.7	Loachit (1996) - Snail Mediated Diseases of NT2 Project Area						x	R	

Other references

Schaller GB & Robinson A (1995) The saola or spindlehorn bavid (Pseudoryx
rhethinensis) in Laos. Oryx 29, 107-114.

Goodland R & Whitten T (1996) Laos PDR: Nam Thoun social and environmental
project (NTSEP): identification mission 10-24 November 1996. World Bank, Washington

3.	Downstream Impacts on Water Quality and Regime	1	2	3	4	5	6	7
3.1	SMEC (1996) - NT2 Project Xe Bang Fai Flood Hydrology Assessment			x	x	x	x	R
3.2	CWR (WA) 1996 - Proposal for "Prediction of Water Quality Characteristics of Proposed Nam Theun Reservoir System"			x	x	x	x	R
3.3	Delmasl (1996) - Greenhouse Gas Emissions versus Thermal Production for NT2 Project			x	x	x	x	R
3.4	NTEC (1997) - Estimation of Residual Biomass and its Distribution in Nam Theun Reservoir			x				Q
4.	Impacts on Aquatic Biodiversity and Commercial Fishery	1	2	3	4	5	6	7
4.1	Kottelat (1996a) - Potential Impacts of NT2 Project on Fish and Aquatic Fauna of Nam Theun and Xe Bang Fai + Appendices + Correspondence		x	x	x	x	x	Q
4.2	TEAM (1996) - Preliminary Projections and Comments on NT2 Reservoir Fishery Potentials				x		x	S
5.	Impacts on Globally Threatened Species/ REFERENCES NOT AVAILABLE IN NTEC BUT MAY BE FROM WCS OFFICE IN VIENTIANE	1	2	3	4	5	6	7
5.1	Thewlis R (1996) - The Status and Conservation of Threatened Bird Species in Laos: A Preliminary Assessment Based on Recent Surveys	x	x			x		
5.2	Schaller G (1995) - A Wildlife Survey in the Annamite Mountains of Laos: Unpubl Report to WCS	x	x			x		
5.3	Duckworth W (1994) - Field Observations of Mammals in Laos : Nat Hist Bull Siam Society	x	x			x		
5.4	Duckworth (1995a) - Ornithological Records from Laos 1994 - 1995: Publ in Forkfail	x	x			x		
5.5	Duckworth (1995) - Notes on the Conservation of the Gibbon (<i>Hylobates gabriellea</i>) Publ in ' ' Laos Tropical Biodiversity 3(1)	x	x			x		
5.6	Schaller / Rabinowiz - The Saola or Spindlehorn Bovid (<i>Pseudoryx nghetinhenses</i>) in Laos : Oryx 29(2)	x	x			x		

6.	Special Data Requested by POE / AVAILABLE IN DOCUMENTS PROVIDED AND IN LIBRARY	1	2	3	4	5	6	7
6.1	Available Lists of Plants and Animal							
6.1.1	Plants a). Tree Species • NOFIP Survey Data • Ref 1.1 - Table 4 b). Aquatic Plants - Ref 3.3 - TH EIA Annex B Table 7 c). Other Groups - Nil							
6.1.2	Aquatic Plankton / Benthos / Invertebrates • E 2 Report - Appendix 2.3 - 1 Table 2 • SMEC EA Report - Table • Ref 3.3 - TH EIA Report - Annex - B - Table 6							
6.1.3	Fishes • Kottelat's Report + Appendix • E.1 Report - Appendix 7 • E.2 Report - Appendix 2.3-1-Table 3-9 • Ref 3.3 TH EIA - Annex B - Section 5.15 • Ref 4.4 Section 6 • Ref 4.6 - Essentially a Species List							
6.1.4	Birds • Ref 1.2 - WCS Ass'ment NT2 Project - Text • Ref 2.1 - NNT Prelim Plan - Appendix 1 • Ref 2.3 - NNT Corridor / Islands - Tables 2 - 5 + Appendix 1 • Ref 2.4 - NNT N Extn - Table 3 & Appendix 4 • Ref 2.6 - WCS TH EIA - Annex 1: Table 7 and Annex 4: Table 10 & 11.							
6.1.5	Mammals • Ref 1.1 - WCS Assent NT2 Project - Table 2 • Ref 2.1 - NNT Prelim Plan - Appendix 1 • Ref 2.3 - NNT Corridor / Islands - Table 1 • Ref 2.4 - NNT N Extn - Tables 4 & 5 Annex 5 • Ref 2.6 - WCS TH Report - Annex - Table 8							
6.2	Maps to Provided to POE							
6.2.1	A/3 - Project Features Map - Colour							
6.2.2	A/3 - Nakai Plateau / Resettlement / Map - Colour							
6.2.3	A/3 - Reservoir Area Villages Map - Colour							
6.2.4	A/4 - Forest Type / Land Use (MGP) - Colour-Fig 3-2 Ref.1.5							
6.2.5	A/4 - Distribution Temporarily Unstocked and Other Non Forest Types - Colour NTEC Version							
6.2.6	A/4 - Basic Timber Demarcation Zones Colour - Fig 3.6 Ref 1.5							
6.2.7	A/2 - NOFIP Forest Type / Land Use Map - Colour - (Outdated)							
6.2.8	A/2 - NT Reservoir - FSL 538 - B/W 1:100,000							
6.2.9	A/2 - NT Reservoir - MOL 528 - B/W 1:100,000							
6.2.10	A/3 - Nakai Nam Theun & Surrounding NBCAs - Colour							
6.2.11	A/4 - Graph - Cash and Imputed Income / HH in Reservoir Area - Colour (See Ref. 2.5)							
6.2.12	A/4 - Graph - Cash and Imputed Income / HH in Catchment Area - Colour.(See Ref 2.5)							
6.2.13	A/4 - WCS Proposed NNT / KL Corridor Map - Colour							

February 1997

NAM THEUN 2 RESERVOIR

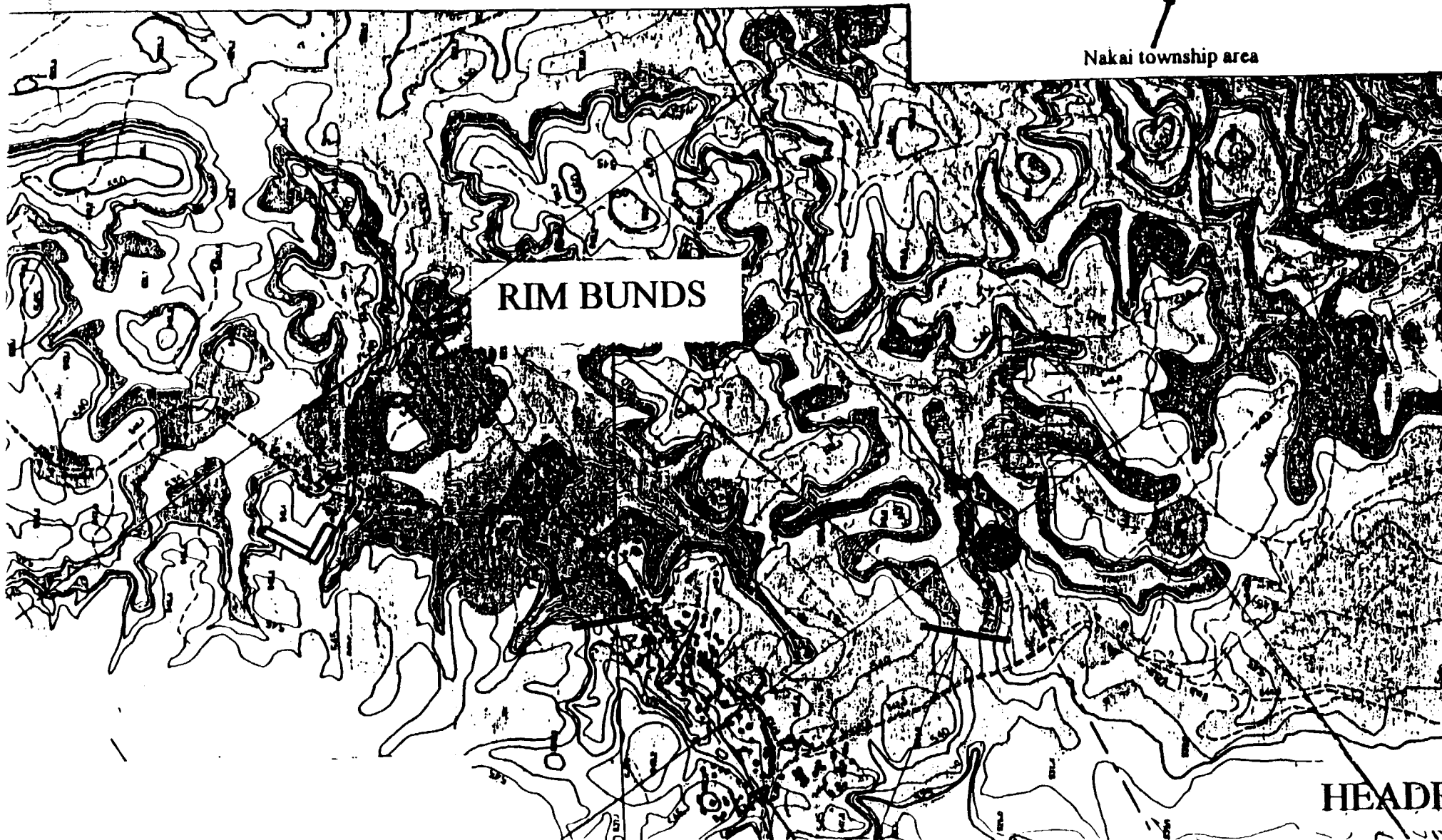
VOLUMES, AREAS

DEPTHS

DESCRIPTION	LEVEL (m)	VOL ($\times 10^6 \text{ m}^3$)	AREA ($\times 10^6 \text{ m}^2$)	AVERAGE DEPTH (m)	MAXIMUM DEPTH (m)
FULL SUPPLY LEVEL (FSL)	538	3,180	450	7.1	45
MINIMUM OPERATING LEVEL (MOL)	527	490	164	3.0	34

EXTENT OF DRAWDOWN AREAS

Pink area is top 3 metres of drawdown (average exposure 8 months, Nov-June)



Annex 5

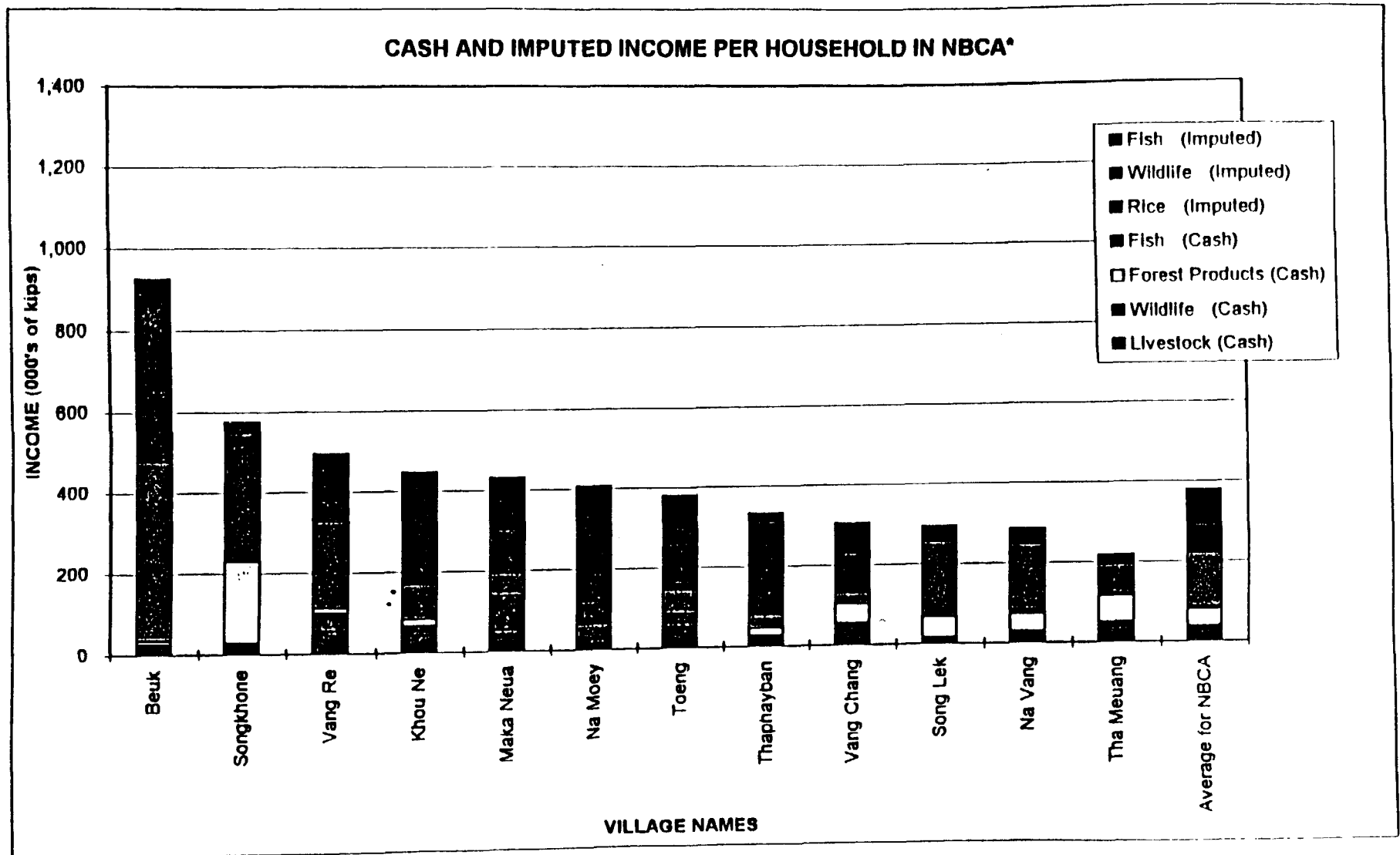
List of Key References and Applicability to POE Requests

- Notes:**
1. Relates to impacts on terrestrial biodiversity and mitigation
 2. Relates to design and management of Nakai Nam Theun NBCA (PCF)
 3. Relates to downstream impacts on water quality and regimes
 4. Relates to impacts on aquatic biodiversity / commercial fishery
 5. Relates to impacts on globally threatened or rare species.
 6. Relates to contains information of some reference to resettlement
 7. S = Document under Revision - Report to be superseded prior to release.
R = Reserved Report - Findings in report need to be carefully interpreted in context of new data and/or changes in NT2 Project.
Q = Quotable Report - Report already released or quoted publicly.
N = Non-quotable Report - Report can not be quoted until officially released.

1.	Impacts on Terrestrial Biodiversity	1	2	3	4	5	6	7
1.1	WCS (1995a) - Wildlife and Habitat Assessment <i>transects</i> of Nam Theun 2 Hydropower Project Area	x	x	x	x	x		S
1.2	WCS (1996a) - Additional Survey re: Corridor & Island Areas	x	x			x	x	Q
1.3	WCS (1996b) - Preliminary Wildlife and Habitat Survey of Northern Extension to NNT NBCA Adjacent Areas	x	x			x		Q
1.4	NOFIP (1995) - Forest Inventory Data for NT2 Reservoir Area - Tree Species Lists / Volumes	x						S
1.5	MGP (1996) - Forestry - Report - NT2 Project	x	x				x	R
2.	Nakai Nam Theun NBCA-Design & Management Plan	1	2	3	4	5	6	7
2.1	WCS (1995) Preliminary Management Plan for NNT	x	x		x	x		Q
2.2	IUCN (1996b) - Inception Report: A Review of Issues and Strategy for Implementation		x			x	x	Q
2.3	CPAWM (1996) - Maps of Traditional Use Areas in NNT - NBCA - (6 maps)	x	x			x	x	S
2.4	CARE (1996) - Socioeconomic and Cultural Survey NT2 Project Area + Appendices	x	x	x	x		x	R
2.5	NTEC (1997) - Community Population, Imputed Value Tables and Graphs	x	x		x		x	R

Annex 5
Additional references

- Goodland R. & Whitten T. (1996). *Lao PDR : Nam Theun social and environmental project*
- Macdonald, M. 1996. *Background Note on Public Health*. World Bank Identification Mission, NTSEP. Nov. 10-24, 1996. World Bank, Washington.
- March, C. 1996. *Nakai-Nam Theun NBA Region, Lao PDR. An Integrated Conservation and Community Development Program. Inception Report: A Review of Issues and Strategy for Implementation*. IUCN. Vientiane
- WCS (1995c). *Investigations into the terrestrial ecology of the area affected by the Nam Theun 2 hydropower scheme*.



* Survey carried out by CARE in February 1996

Annex 5. List of Key References Made Available for Review

INDIGENOUS PEOPLES OF THE NAKAI-NAM THEUN NBCA

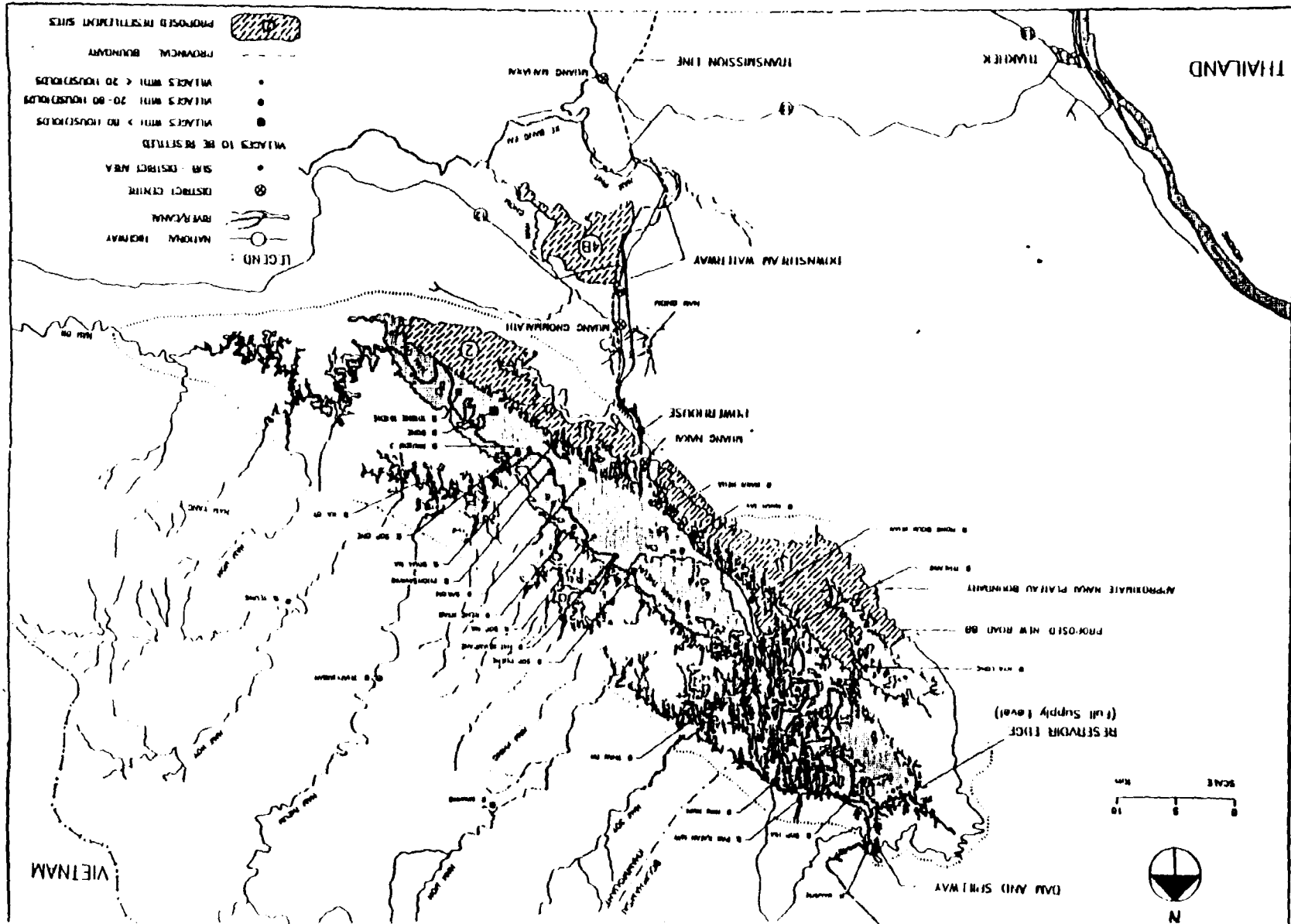
RIVER SYSTEM	ETHNIC CLASSIFICATION	ETHNIC GROUP	POPULATION (APPROXIMATE)	AGRICULTURAL SYSTEM
NAM SOT	Vietic:	Arao	150	Vietic: non-proprietary swidden, h&g; Tai: swidden, some paddy
		Malang	95	
NAM SOT	Tai-Kadai:	Arel	16	
		Maleng	185	
		Kaleung	{ 140	
		Phou Thay	586	
NAM MONE	Katuic:	Brou	1,050	some terraced paddy at Na Vang (done by Sek originally); swidden (non-proprietary)
			1,050	
NAM THEUN	Vietic:	Salang-X	38	swidden, h&g; swidden (non-proprietary & pioneering)
	Katuic:	Brou	2,970	
			3,008	
NAM NOY	Vietic:	Kri	190	swidden, h&g; swidden (non-prop) terraced paddy, permanent swidden plots
		Phong	500	
	Katuic:	Brou	850	
	Tai Kadai:	Sek	300	
			1,840	
NAM PHEO	Katuic:	Brou	70	swidden terraced paddy, permanent swidden plots
	Tai-Kadai:	Sek	800	
			870	
NAM ONE	Vietic:	Salang-Z	10	h&g
			10	
			7,364	

Classification:

Austroasiatic (Mon-Khmer):

Vietic (est. pop. 1,184 = 16.7 %)
Katuic (est. pop. 4,940 = 67.08 %)

Tai-Kadai: Southwestern Tai; Sek (est. pop. 1,240 = 16.83 %)



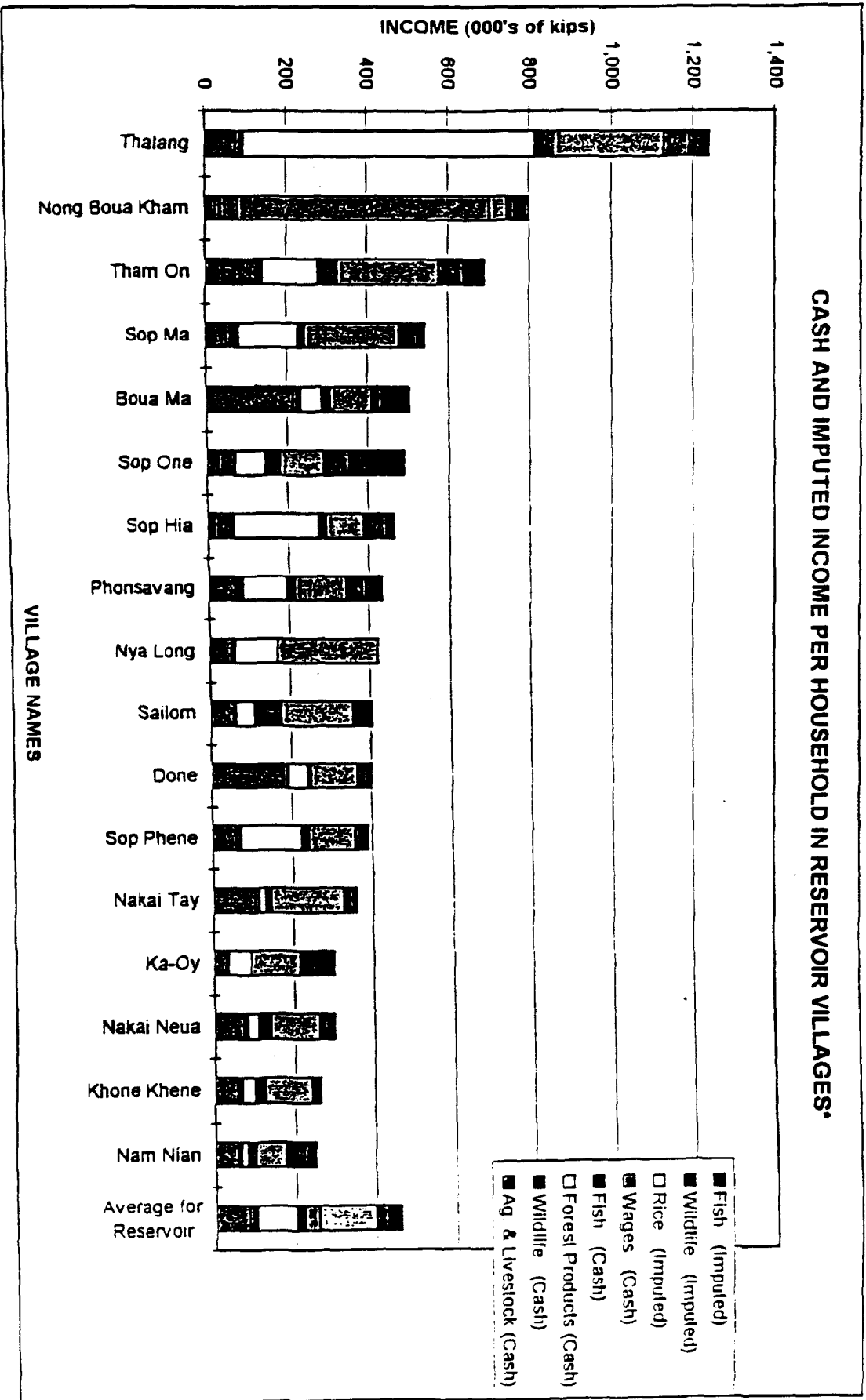
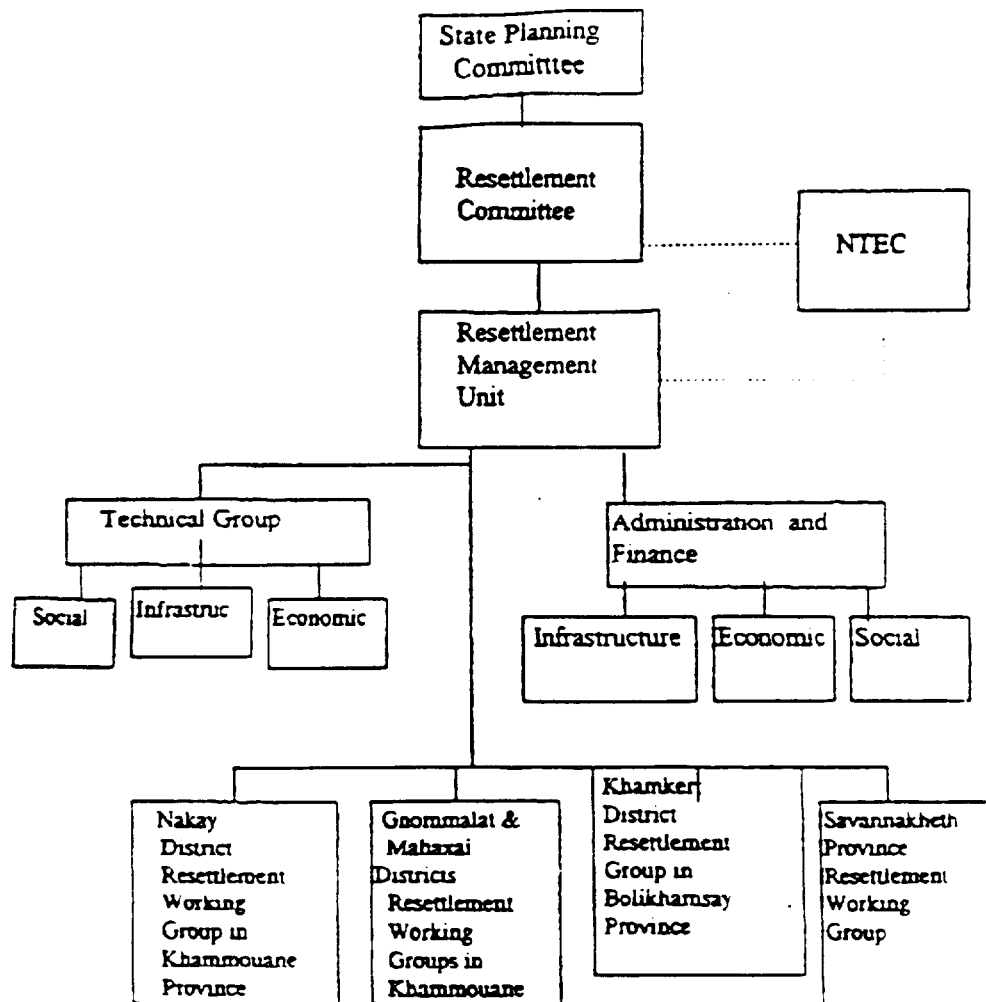


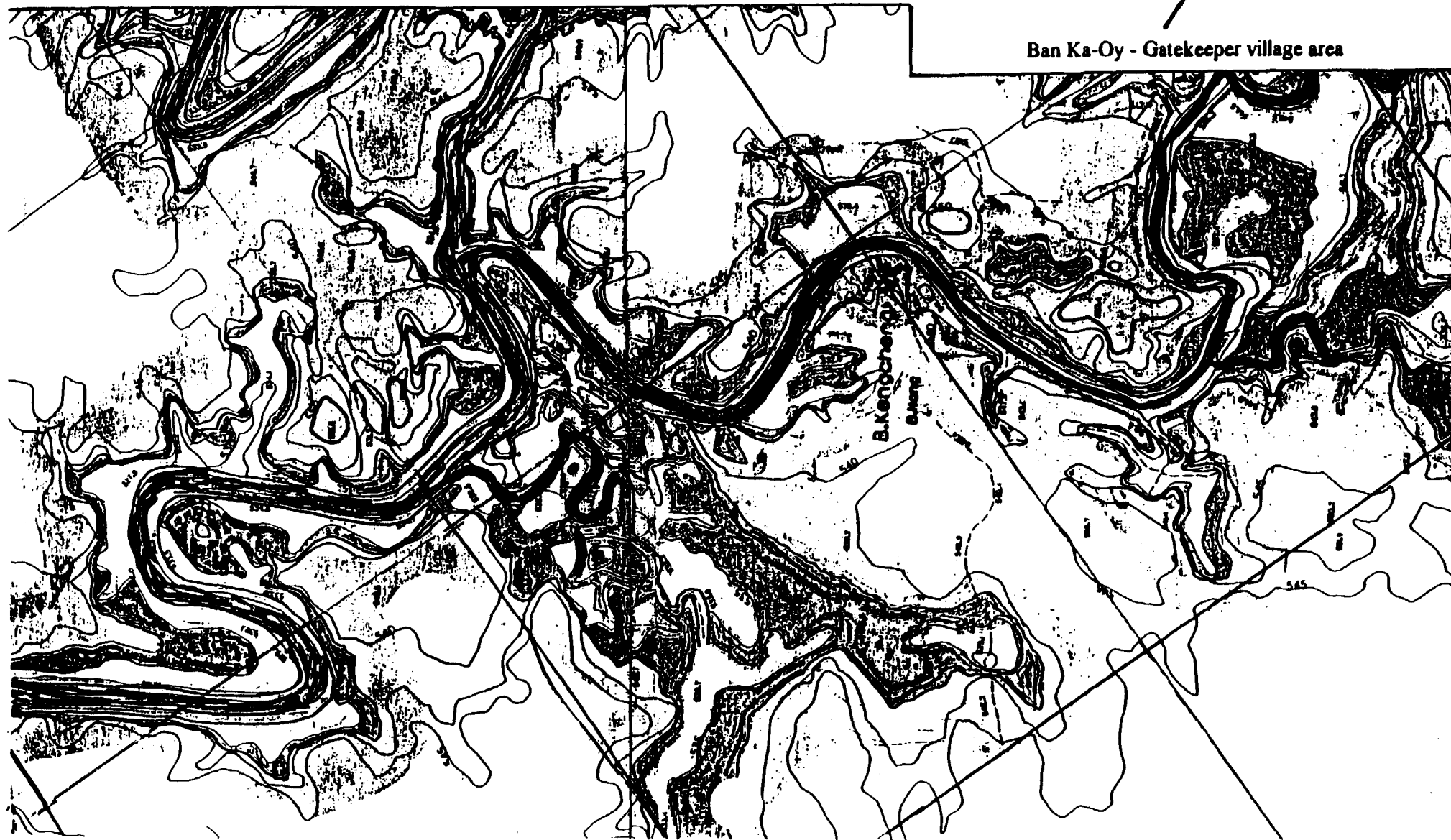
Figure 1. Resettlement Organization Structure of GOL for Nam Theun 2 Project - 1997



Pink area is top 3 metres of drawdown (average exposure 8 months, Nov-June)



Ban Ka-Oy - Gatekeeper village area



Annex 4. Information on the NNT-NBCA Population