UPLAND FISHING AND INDIGENOUS PUNONG FISHERIES MANAGEMENT

in Southern Mondulkiri Province, Cambodia

WILDLIFE CONSERVATION SOCIETY

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Note on species names

No specimens were collected during this study, since the focus was on social rather than biological aspects. Therefore all species names given in the text should be treated as provisional.

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INTRODUCTION

The Southern Mondulkiri Biodiversity Conservation Project (SMBCP), jointly implemented by the Wildlife Conservation Society (WCS) and the Forestry Administration (FA) and operated under the overall management of the Ministry of Agriculture, Forestry and Fisheries (MAFF), aims at promoting suitable land-use management that allows for effective conservation of wildlife and key resources.

Fish resources in the project area in Mondulkiri Province have come increasingly under pressure and drastic declines in fish catches are reported. A variety of causes are suggested for this trend, including intensified use of illegal and environmentally unsound fishing gears and encroachment of outsiders into traditional fishing grounds and forest lands of Punong (=Phnong) villages. A continued loss of fisheries resources could increase the pressure on other resources which are equally vital for the livelihoods of the Punong people.

The present study was commissioned by WCS in order to identify opportunities and strategies for the sustainable utilization of aquatic resources. It focused on three administrative villages in the SMBCP, namely O Am, Kati and Andong Kraloeng. Its immediate objective was to "provide an initial understanding of the role of fisheries in selected communities in the landscape area that will allow for the integration of upland fisheries into natural resource management programmes at the village and landscape level". The study focused on social and ecological setting, practice of fishing operations, fisheries as part of natural resources management structures, historical dimensions, and economic and social trends and their implications for NRM.

The study followed largely a qualitative approach. Complementary to empirical social science instruments such as semi-structured interviews of randomly and/or purposely selected individuals or groups, a variety of participatory tools were used. Meetings and interviews were geared towards generating information, but also served to enhance villagers' willingness to actively engage in fishing practices that are environmentally sound and economically and socially beneficial in the long term. A standard form was used to conduct a census of the main fishing gears and their operation, and selling and buying of fish products. Complementary to this, a survey of reported fish migrations and fishing operations was conducted, using transects and semi-structured interviews with key persons, in villages along the middle and lower reaches of the Chhlong river.

ECOLOGICAL AND BIOLOGICAL FEATURES

The study area is part of the Chhlong river ecosystem. The source of the Chhlong river is located in the up-lands of O Rang district (at approx. 460 masl) between the Punong villages of Pu Poanh and Pu Chu Loe. Its headwaters drain the southern slopes of the Sen Monorom Plateau, also called the Chhlong Plateau.

Along the Chhlong River's 200 km path down-stream, its waters are fed by a series of tributaries of different sizes, with some of the smaller creeks drying out completely during the dry season. Physiographically, the Chhlong river can be divided into four sections: the ***head waters***, from the upper reaches of the river and its uppermost tributaries down to the waterfalls; the ***middle reaches*** from the waterfalls down to the junction where

the O Pórr river enters the Chhlong; the ***lower Chhlong basin***, comprising the stretch between the junction with the O Pórr river and Boeng Kiep Village in Kratie Province (roughly the maximum point to which waters of the Mekong back up at times during the year); and the Mekong back-up from Boeng Kiep to the Mekong River.

The target villages of the present study are located partly within the upper part of the middle reaches and the head waters of the Chhlong river and its tributaries. In this area there are many streams, all of which have names in Punong language evidence that they are important landmarks. Likewise, all waterfalls and important deep pools are given specific names, and most of them are also attractive fishing grounds.

The dry season, from November to April, and rainy season, from early May to October, condition water availability in the rivers and mark the rhythm of fishing seasons and gear use patterns. The seasonal flood-pulse drives the fisheries system by increasing the water volume in the rivers, inundating vast areas of floodplains and re-connecting swamps, ponds and lakes to the river channels. The Chhlong river and its tributaries are functionally linked to the Mekong River and its associated floodplains, including the Tonle Sap Great Lake floodplains, through spawning, refuge and feeding migrations mainly of the long-distant migratory fish species.

In general terms, fish start migrating up-stream in late April or May at the beginning of the rainy season, penetrating into the headwaters and tributaries and entering the upriver flood plains that are intermittently connected to the river system according to local water levels.

Waterfalls mark drastic changes in elevation at the headwaters and constitute natural filters for fish migrations. Many migratory species only reach the lowest waterfall. However, a number of species are reported to overcome sizable waterfalls (8-10 m high) and migrate up to the headwaters. According to rainfall and water depth, fish undertake a sort of oscillating lateral migration between flooded areas and nearby pools, moving to the pools when waters are low and returning to the flooded areas with new rains. Fish also make short longitudinal migrations between different pools along the riverbed. All fish species found in the headwaters of Chhlong river reportedly spawn there, mostly in June.

Most fish migrating downstream in the Chhlong river basin (generally from September to November) re-enter the Mekong river. However, there are some species that stay in pools in the lower reaches of the Chhlong river. Big fish species apparently stay just a short time within the river basin and they are the first to migrate down-stream. Smaller specimens of these species commonly stay a longer time in the river basin and down-migrate with other fish species, starting later in September.

PEOPLE

The Punong are indigenous people. Together with other indigenous groups they represent around 70% of the population in Mondulkiri province. Kati and Andong Kroloeng villages consist primarily of ethnic Punong people, but a few Khmers have moved in either to do business or as a result of intermarriage with Punong. Both Kati and Andong Kraloeng are officially recognized administrative villages, but comprise numerous smaller socially recognized Punong settlements (3 in the case of Kati, and 6 in the case of Andong Kraloeng). In general, public administration refers to these settlements as "krom" or sector, though sometimes one krom consists of two separate settlements.

The administrative village of O Am differs significantly from Kati and Andong

Kroloeng. It is a major market place and point of in-migration, and is divided into 18 "kroms" with mostly Khmer families (>82%), and some Stieng (6%) and Punong (8%) in addition to four ethnic Vietnamese and five ethnic Lao families.

Natural Resource Use and Livelihoods

Punong traditional culture reflects their dependence on the forest. Their livelihood and coping strategies are based on a deep ecological knowledge that allows them to take advantage of native trees and other plants, fish and other animals, rivers and land. They have traditionally hunted, raised buffaloes, cows, pigs, chickens and dogs, fished in rivers and ponds and collected a variety of forest products for food, use in construction or fishing (fishing gear and fish poisons), and medicinal purposes. The forest has provided substantially for food security, with a vast variety of products available during the yearly cycle. At times when a cultivated crop is scarce, a substitute can often be found; for example, natural tubers may substitute when rice stores are low.

The importance of fishing and the collection of other aquatic animals is indicated by the time people dedicate to this activity, which is, reportedly, much more than the time spent hunting for terrestrial animals. The consumption of domestic animals is largely restricted to sacrifices and other special occasions. Traditionally, fish was never sold, but shared. Today, fish products are becoming increasingly a commodity of trade.

Fishing operations

Punong people in the headwaters of the Chhlong river have, traditionally, used a rather limited number of fishing gears, compared to the enormous variety of fishing gears and methods used in the floodplains of the Tonle Sap and Mekong. The spectrum of traditional gear types includes fishing by hand, scooping baskets (chneang), covering and lifting gears, hook lines, gillnets, basket traps, small barrage systems, and pumping out of small water bodies. Gillnets and hooks are the most frequently fishing gears.

By far, the most important fishing method in Punong villages has been, traditionally, fishing with natural poisons. This method has been critical for providing villagers with a large amount of fish in a short time, allowing them to make fish paste (locally called "ka óm". Fishing with natural poisons is part of the cultural heritage of the Punong. Commonly, the use of this method is slightly different in each location and requires the consent of the spirits and a well organized group of people to cope with multiple tasks. Environmentally, natural poisons appear to have limited long term impact, and they naturally degrade and lose their effectiveness within 24 hours. Snakeheads and most catfish species, crustaceans, amphibians, and humans are all little affected by the natural substances.

Most other fishing activities are undertaken individually and without any gender differentiation, with two exceptions: scooping baskets are only used by women and children, and castnets are largely used by men. However, men participate more intensively in fishing activities than women.

Cosmovision

Punong animist religious beliefs and practices are shaped by the need to provide access to, share and make the best use of vital resources. Within the Punong worldview, humans are part of a community of beings. Social values such as reciprocity and respect for each other apply to human-animal as well as human-human relationships. These relationships are controlled by the spirits which inhabit mountains, special forest places and/or trees, salt licks, waterfalls, or deep pools in rivers or ponds.

Places which spirits are believed to inhabit are associated with vital and potentially high yielding natural resources. Often they can be dangerous and life threatening. In order to protect individuals and the community, rules of conduct (including taboos) are invoked periodically or at specific events. Collective spirit ceremonies create

transparency and cohesion within the community; ceremonies are not a matter of secret worship by an individual but are celebrated as public events. The obligation to hold a spirit ceremony in places that potentially yield abundant harvests eventually implies sharing of the harvest. It is considered not possible for an individual to conduct a major fishing operation with natural poisons, unless he is willing to risk that the spirits punish him and/or the community. Thus, spirits facilitate cultural, social and physical reproduction of the community as an institution.

Traditional Natural Resources and Fisheries Management

Traditional Management Institutions

A Punong "village" is defined by a set of village specific attributes including a village "neak ta" (guardian spirit), boundaries and a burial ground. Villagers have a clear understanding of their village boundaries. Traditional Punong authorities, with their main function as stewards of local cultural values, are still more influential than formal authorities appointed by higher level authorities. The most important traditional authorities are "me Kontreanh", "chas srok", and the elders. Every village clearly identifies its elders representing the different family lines. They are very important in transmitting Punong non-written culture, from one generation to the next, and are vested with a high degree of authority. Frequently, they participate next to the chas srok in conflict resolution and give advice to young people and newly married couples. The village elders, chas sroks, etc. function within the context of the modern administrative system of village and commune chiefs. Conflicts between generations do not seem to be very significant currently, even though younger generations have different interests than the elders. Customary laws not only include but are based on obligations to the ancestors or the spirits. Taboos and rules of respect to the spirits act as deterrents and are enforced by the elders.

Traditional Fisheries Management Rules

Access and rights regimes are central elements of fisheries management. Fisheries management measures are embedded into the cultural background (cosmovision, knowledge system, traditions, religious beliefs, etc.) of Punong people.

Traditional fisheries management includes both intentional and inadvertent measures. Practices and taboos related to appeasing the spirits and preventing the community from suffering punishment by the spirits can be seen as management measures as they directly regulate access to the resources and influence their sustainability.

Access to fishing grounds is granted as set of rules of conduct with regard to different types of fishing grounds, including rules of respect to the spirits. In principle, access to fish is granted to everybody who follows these rules. Individual fishing is allowed everywhere, except in areas reserved for communal fishing with natural poisons and certain closed areas. This measure translates into geographically limiting the resource pressure. Closed areas are often deep pools associated with waterfalls. Their existence limits fishing effort and facilitates stock recovery and recruitment. Taboos and rules of conduct that relate to expressing modesty and respect to nature while retrieving benefits from it are widespread. The main gear restriction is on the dose of natural substances used in poisoning. Introduced and highly damaging fishing methods, such as electrocuting, chemical poisoning, throwing of grenades and the use of small mosquito net bagnets are rejected and negatively sanctioned by the traditional authorities. The principle of sharing of wild products effectively translates into economizing use of natural resources, including fish. Certain places, including some pools, can only be accessed for poison fishing following a sacrifice to the local spirit. Sacrifices are an integral part of the fishing activity in these areas. The sacrifice is intended to provide for a bountiful fish catch, but also limits fishing intensity by individuals because costs are incurred by "investing" in a spirit ceremony.

Formal legal framework

All fishing activities undertaken within the "inland fisheries domain" are subject to the 1987 Fisheries Law of the Kingdom of Cambodia. The Department of Fisheries (DoF) is responsible for the development of fisheries policies, their application and enforcement. The present draft of a sub-decree of community fisheries development puts strong emphasis on the role of DoF in facilitating community fisheries.

The study area is located mainly within the Seima Biodiversity Conservation Area. The Forestry Administration is responsible for managing the area and ensuring that it is used sustainably for the development and livelihoods of the local communities in the area. The Land Law (Articles 23-28 and 138-141) gives local people the right to live in the area.

RECENT TRENDS

This study was undertaken at a moment of crisis. Livelihoods of Punong people have been affected by external factors outside the control of their communities. Two major reasons for this situation include acculturation and resource pressure.

Acculturation

State assertion of control over Punong areas and in-migration of outsiders (particularly in O Am and Chnaeng) has translated into disregard for their cultural values, mistreatment, decimation of wildlife and loss of resin trees and land, and subjection to national laws that make little or no consideration for their life style and needs for livelihoods. Punong people often express feelings of being treated as second class citizens by the mainstream Khmer society. These effects have been intensified by improved communication and access to markets. External influences, such as aggressive proselytizing by other faiths that do not relate to the ecology of the forests as the Punong's traditional beliefs have radically change the way Punong people look at their natural environment. Furthermore, the nationwide process of political and administrative decentralization (emphasizing strengthening the commune councils) has led to increased centralization in Punong communities, where for most purposes villages were traditionally the highest level of organization. Imperfect governance practices impact negatively on the natural resources themselves as well as on NRM processes that rely on engaging people and institutions at various levels of management.

Resource pressure

The massive loss of resin trees (and thus loss of significant cash income) to logging has triggered a series of compensatory trends among the Punong, including more intensified exploitation of resin and other non-timber forest products, increased hunting activities, and expansion of cash crop cultivation and wage labor.

In addition, the Punong engage increasingly in illegal activities, such as logging, hunting, and fishing with highly damaging fishing gears. Throwing of grenades, electrofishing, fishing with very strong chemical poisons (generally called "Anthrine") and small stationary double wing bag-nets made of mosquito netting ("du") are used by Cham and Khmer, newcomers, Vietnamese poachers, and Punong people themselves have begun experimenting with electric gears and "du". The result has been a further erosion of traditional conservation practices.

Illegal fishing activities are not limited to the study area but wide-spread across the river basin. Even if people in the study area were to succeed in managing their fisheries in a sustainable way, fisheries could still be wiped out if down-stream fish stocks and habitats were destroyed. With the absence of the Department of Fisheries in the province there is no government agency that has a clear mandate and sufficient capacity to curb illegal fishing.

CONSEQUENCES FOR MANAGEMENT

There is a gap between the Fisheries Law and formal regulations that provide the framework for fisheries management

throughout the country and the traditional management mechanisms that have developed over centuries. And new arrivals (immigrants and armed forces alike) are competing directly with the original residents for subsistence and commercial fishing.

The limited capacity of patrol teams to enforce the law, together with an increase in illegal fishing activities, contribute to an accelerating process of erosion of Punong cultural values and their traditional fisheries management regime. The general weakness of governance of mainstream society is felt more strongly by Punong villagers since they have less experience and confidence in defending themselves than do others. The capacity of Punong people to reinvigorate their cultural values and livelihood strategies will determine their ability to defend their ancestral land area and its resources from outsiders.

For the future, three possible scenarios of development can be visualized:

Scenario 1: Punong culture, their value system and social cohesion are strong enough to survive and flexibleenough to adapt to externalities. This would lead to innovation of pproaches to cope with the new situation or new trends while preserving the conservati onist philosophy of their traditional use of natural resources, including fish. There could be positive spillover effects on in-migrants and civil society.

Scenario 2: Punong communities suc cumb to external pressure and participate in the "race for the fish". As a consequence, their traditional values and fisheries management system disappear. Punong and other indigenous people would have to compete with outsiders, police, and military. Their culture would gradually disappear.

Scenario 3: This scenario is midpoint between scenarios 1 and 2. The culture of indigenous people suffers from external influences and they participate in the "race for the fish". Indigenous fishers adapt new fishing practices while largely maintaining their traditional values.

RECOMMENDATIONS

On the base of the findings of the study, a number of preliminary recommendations can be formulated:

- All efforts to facilitate sustainable resource management need to address the sphere of local governance, including rule of law, transparency and accountability. Improving environmental governance in the target area will also have to fully take into account the idiosyncrasies of the Punong and ther indigenous people.

- Efforts must be made to understand and reaffirm surviving traditional management and knowledge systems, eventually to be adapted, included in, and applied to locally developed and community-based management within individ ual communities, over larger areas, or in the entire river basin. Local government and line agencies should be assisted in improving their understanding and consideration of the Punong people, their culture, and traditions, in order to strengthen Punong cultural identity and traditional authorities. The government (local and central) needs to accept the legitimacy of indigenous peoples' rights to their ancestral lands, their traditional system of management and their social and cultural institutions. Specifically:
  - Participatory research should be conducted on Punong cultural institutions and traditional authorities.
  - The use of Punong language shouldbe promoted, through audio-visual materials in the Punong language and providing opportunities for WCS staff to learn the language.
  - Traditional village authorities should be reinforced by supporting intergenerational learning.
  - The negative effects of external influences that can destroy the Punong's cultural identity (including external religious groups) should be monitored and minimised.
  - Meetings should be organized for people from different areas to reach common understanding on traditional management systems.
  - The Punong should be helped to document their traditional management systems in a way that is useful to them and allows them to improve, adapt, and apply these systems to the changing conditions within their communities.
  - Participatory action research should be conducted on Punong traditional natural resource management systems regarding fish and other resources.
  - Punong communities should be assisted in mapping fishing rounds, spiritsites, and important resource areas, in particular deep pools.
  - The use of natural poisons should be reaffirmed as an environmentally sound fishing practice.
  - Official acknowledgement of the right of the Punong to manage their fisheries according to traditional systems and to exclude others should be sought.
  - Punong communities should be helped to protect their land from land-grabbing and title their traditional lands (including fishing grounds), focusing attention on traditional village units instead of administrative villages where they are different.

- A rights-based approach to resource management should be implemented to guide develop ment agendas. Community consultation should be obligatory for all development projects that could impact negatively on indigenous communities, and self-determination of indigenous peoples should be promoted.

- Bottom-up approaches to NRM should be explored. Due recognition should be given to local management institutions and they should play a central role in management planning.

សេចក្តីសង្ខេប

តំរោងអភិរក្សជីវៈចំរុះភាគខាងត្បូងខេត្តមណ្ឌលគីរី បានអនុវត្តដោយមានការចូលរួមរវាងសមាគមអភិរក្សសត្វព្រៃ (WCS) និងរដ្ឋបាលព្រៃឈើ ហើយបានប្រតិបត្តិនៅក្រោម ការគ្រប់គ្រងរួមរបស់ក្រសួងកសិកម្ម រុក្ខាប្រមាញ់ និងនេសាទ តំរោងនេះមានគោលបំណងលើកតំកើងនូវការគ្រប់គ្រងប្រើប្រាស់ដីធ្លីឱ្យបានសមស្រប ដែលអនុញ្ញាតិសំរាប់ការអភិរក្សសត្វព្រៃ និងធនធានសំខាន់ៗឱ្យមានប្រសិទ្ធិភាព។

ធនធានជលផលក្នុងតំបន់តំរោងដែលស្ថិតនៅក្នុងខេត្តមណ្ឌលគីរីនេះទើបបានកើនឡើងនៅក្រោមសម្ពាធនៃការចាប់ត្រីដែលមានការថយចុះខ្លាំងក្លាតាមរយៈរបាយការណ៍របស់អ្នកភូមិ។ មូលហេតុនៃការផ្លាស់ប្តូរមួយនេះ ត្រូវបានស្នើសុំសំរាប់និន្នាការនេះរួមមានការប្រើប្រាស់ឧបករណ៍នេសាទខុសច្បាប់កាន់តែខ្លាំងឡើងមិនត្រឹមត្រូវនឹងបរិស្ថានការទន្ទ្រានរបស់អ្នកខាងក្រៅតំបន់ចូលទៅក្នុងដែននេសាទជាប្រពៃណី និងដីព្រៃរបស់អ្នកភូមិជនជាតិភ្នង។ ការបាត់បង់ធនធានជលផលជាបន្តបន្ទាប់អាចជាសម្ពាធមួយដ៏ខ្លាំងក្លាទៅលើធនធានផ្សេងៗទៀត ដែលចាំបាច់សំរាប់ការប្រកបរបរចិញ្ចឹមជីវិតរបស់ជនជាតិភ្នង។

ការសិក្សាបច្ចុប្បន្ននេះត្រូវបានបំពេញបេសកកម្មដោយសមាគមអភិរក្សសត្វព្រៃ (WCS) ដើម្បីកំណត់អត្តសញ្ញាណកម្មទៅលើឱកាស និងយុទ្ធសាស្ត្រសំរាប់ការប្រើប្រាស់ធនធានវារីសត្វឱ្យមាននិរន្តរភាព។ ការសិក្សានេះផ្តោតទៅលើភូមិ ៣ ដែលស្ថិតនៅក្នុងតំរោងអភិរក្សជីវៈចំរុះ "សីមា" ភាគខាងត្បូងខេត្តមណ្ឌលគីរី ភូមិអូរអាម ភូមិកាទី និងភូមិអណ្តូងក្រឡឹង។ គោលបំណងជាបន្ទាន់របស់ការសិក្សានេះគឺដើម្បី "ផ្តល់នូវការយល់ដឹង ជាដំបូងនូវតួនាទីរបស់ជលផលក្នុងការជ្រើសរើសសហគមន៍នៅតំបន់ទេសភាព ដែលនឹងអនុញ្ញាតិសំរាប់ការធ្វើសមាហរណកម្មជលផលនៅតំបន់ខ្ពង់រាបទៅក្នុងកម្មវិធីគ្រប់គ្រងធនធានធម្មជាតិថ្នាក់ភូមិ និងថ្នាក់តំបន់ទេសភាព"។ ការសិក្សានេះបានផ្តោតទៅលើសង្គម និងការបង្កើតអេកូឡូស៊ីការនេសាទជលផលគឺជាផ្នែកមួយនៃរចនាសម្ព័ន្ធក្នុងការគ្រប់គ្រងធនធានធម្មជាតិជាទ្រង់ទ្រាយប្រវត្តិសាស្ត្រ និន្នាការសេដ្ឋកិច្ច និងសង្គម និងទំនាក់ទំនងសំរាប់ការគ្រប់គ្រងធនធានធម្មជាតិរបស់ជនជាតិភ្នង។

ការសិក្សានេះទទួលបានលទ្ធផលដ៏មានគុណភាពយ៉ាងធំធេងមួយ។ ដោយបន្ថែមទៅលើឧបករណ៍ពិសោធន៍វិទ្យាសាស្ត្រសង្គមដូចជាការសំភាសន៍ពាក់កណ្តាលផ្លូវការដោយចៃដន្យ ឬ ការជ្រើសរើសមួយៗ រឺជាក្រុមឧបករណ៍ខុសៗគ្នាត្រូវបានយកមកប្រើប្រាស់។ ការប្រជុំ និងសំភាសន៍ជាច្រើនត្រូវបានធ្វើឱ្យមានជាពិតមានឡើង ប៉ុន្តែវាបានបម្រើដល់អ្នកភូមិដោយមានការស្ទ្រាតិត្តយ៉ាងសកម្មផងដែរក្នុងការនេសាទដោយផ្តោតទៅលើបរិស្ថានជុំវិញ ចេះសន្សំសំចៃ និងការរកចំណូលនៅក្នុងសង្គមសំរាប់រយៈពេលវែង។ ទំរង់គំរូមួយត្រូវបានយកមកប្រើប្រាស់ក្នុងការធ្វើជំរឿនចំនួនឧបករណ៍នេសាទចំបងៗជាច្រើន ការធ្វើនេសាទ ការលក់ និងការទិញផលិតផលត្រី។ ទាំងនេះបន្ថែមទៅលើការប្រមូលពត៌មានពីចរាចររបស់ត្រី និងការធ្វើនេសាទត្រូវបានធ្វើឡើងដោយប្រើប្រាស់វិធីសាស្ត្រគំនូសកាត់ទទឹង និងការសំភាសន៍ពាក់កណ្តាលផ្លូវការជាមួយមនុស្សសំខាន់ៗនៅក្នុងភូមិតាមបណ្តោយអូរឆ្លងដែលនៅភាគកណ្តាល និងភាគខាងក្រោម។

លក្ខណៈអេកូឡូស៊ី និងជីវសាស្ត្រ

តំបន់សិក្សានេះគឺជាផ្នែកមួយនៃប្រព័ន្ធអេកូឡូស៊ីនៅតាមអូរឆ្លង។ ប្រភពទឹកអូរឆ្លងមានមកពីតំបន់ដីខ្ពង់រាបនៃស្រុកអូររាំងនៅចន្លោះភូមិពូប៉ូញ ភូមិពូជូក្រោម និងភូមិពូជូលើ។ ក្បាលអូរឆ្លងហូរមកពីផ្នែកខាងត្បូងនៃទីជំរាលខ្ពង់រាបសែនមនោរម្យហៅថា ខ្ពង់រាបឆ្លង។

តាមបណ្តោយអូរឆ្លងប្រវែង ២០០ គីឡូម៉ែត្រ មានផ្លូវថ្មើរជើងនៅភាគខាងក្រោម ទឹកអូរនេះបានមកពីពាមជាច្រើនដែលមានទំហំខុសៗគ្នា ជាមួយអូរតូចៗមួយចំនួនដែលរីងទាំងស្រុងនៅរដូវប្រាំង។ តាមលក្ខណៈរូប ភូមិសាស្ត្រ អូរឆ្លងអាចចែកចេញជាបួនផ្នែក: ក្បាលអូរដែលមានប្រភពមកពីផ្នែកខាងលើនៃអូរ និងពាមដែលខ្ពស់បំផុតរបស់អូរនេះ

ហូរធ្លាក់ទៅក្នុងជ្រោះភាគកណ្តាលនៃអូរមានប្រភពមកពីជ្រោះជាច្រើនដែលហូរធ្លាក់ទៅក្នុងទីប្រសព្វរវាងអូរព័រ ផ្នែកខាងក្រោមនៃអូរឆ្លងបានហូរយឺត។ទៅដល់ចំណុចប្រសព្វរវាងអូរព័រ និងភូមិបឹងកែប ស្ថិតនៅក្នុងខេត្តក្រចេះ (ការប្រែប្រួលចំណុចខ្ពស់បំផុតនៃទឹកទន្លេមេគង្គឡើង ឬ ក៏ចុះអាស្រ័យទៅនឹងពេលវេលានៃឆ្នាំ) ការហូរចុះឡើងនៃទឹកទន្លេមេគង្គ មានប្រភពមកពីបឹងកែបហូរទៅកាន់ទន្លេមេគង្គ ។

ភូមិគោលដៅនៃការសិក្សាបច្ចុប្បន្ននេះត្រូវបានរកឃើញជាផ្នែក។ ដែលមាននៅភាគខាងលើ ភាគកណ្តាលក្បាលទឹក និងពាមរបស់អូរឆ្លង។ នៅក្នុងតំបន់នេះមានអូរជាច្រើនដែលឈ្មោះរបស់វាត្រូវបានហៅជាភាសាភ្នងដែលជាភស្តុតាងសំគាល់យ៉ាងសំខាន់។ ដូចគ្នានេះដែរគ្រប់ជ្រោះ និងអន្លង់សំខាន់។ត្រូវបានឱ្យឈ្មោះជាក់លាក ហើយភាគច្រើនទាក់ទាញទៅនឹងដែនសេាទផងដែរ។

រដូវប្រាំងចាប់ពីខែ វិច្ឆិកា ដល់ ខែ មេសា ហើយរដូវវស្សាចាប់ផ្តើមពី ដើមខែ ឧសភា ដល់ ខែ តុលា លក្ខខណ្ឌទឹកមានគ្រប់គ្រាន់នៅក្នុងអូរ និងកំណត់នូវចង្វាក់នៃរដូវនេសាទ និងឧបករណ៍នេសាទដែលបានប្រើប្រាស់ជាគំរូ។ រដូវកាលទឹកលិចមកដល់បានបណ្តាលឱ្យមានជាប្រព័ន្ធជលផលតាមរយៈការកើនឡើងនៃបរិមាណទឹកក្នុងអូរ និងតំបន់ជនលិចល្វឹងល្វើយនៃតំបន់លិចទឹក និងការភ្ជាប់ឡើងនៃវាលភក់ បឹង និងត្រពាំងទៅកាន់អូរ។ អូរឆ្លង និងដៃជាច្រើនរបស់វាមានតួនាទីហូរភ្ជាប់ទៅនឹងទន្លេមេគង្គ និងតំបន់លិចទឹកជាច្រើន រួមមានទំនាបលិចទឹកជុំវិញបឹងទន្លេសាបរហូតទៅដល់វាលល្បាប់ភក់ ដែលជាទីជំរក និងជាកន្លែងរកចំណីសំខាន់។របស់ប្រភេទត្រីធ្វើចរាចរចំងាយឆ្ងាយ។

ជាទូទៅ ត្រីចាប់ផ្តើមធ្វើចរាចរទៅភាគខាងលើនៃអូរនៅចុងខែមេសា ឬ ឧសភានៅដើមរដូវភ្លៀងឡើងទៅដល់ក្បាលទឹក និងពាមជាច្រើនហើយចូលទៅទំនាបលិចទឹកភាគខាងលើនៃអូរដែលត្រូវបានភ្ជាប់ដោយចោះ។ ទៅកាន់ប្រព័ន្ធនៃអូរ អាស្រ័យទៅលើកំរិតទឹកក្នុងតំបន់។

ជ្រោះសំគាល់នូវការផ្លាស់ប្តូរយៈកំពស់ដ៏ខ្លាំងក្លានៅក្បាលទឹក ហើយបង្កើតជាចំរោះធម្មជាតិសំរាប់ចរាចរត្រី។ ប្រភេទត្រីធ្វើចរាចរភាគច្រើននឹងអាចទៅដល់ជ្រោះទាបជាងគេប៉ុណ្ណោះ។ ប៉ុន្តែចំនួននៃប្រភេទត្រីត្រូវបានរាយការណ៍ថា អាចមានលទ្ធភាពឡើងទៅកាន់ជ្រោះ (កំពស់ពី ៨-១០ ម៉ែត្រ) ហើយធ្វើចរាចរឡើងទៅដល់ក្បាលទឹក។ អាស្រ័យទៅលើភ្លៀងធ្លាក់ និងជំរៅទឹក ត្រីព្យាយាមធ្វើចរាចរនៅតាមខាង។ រវាងតំបន់លិចទឹក និងតំបន់ក្បែរអន្លង់ផ្លាស់ទីទៅកាន់អន្លងវិញនៅពេលដែលទឹកទាប និងត្រឡប់មកតំបន់លិចទឹកវិញនៅពេលភ្លៀងធ្លាក់សារជាថ្មី ត្រីធ្វើចរាចរខ្លីតាមបណ្តោយរវាងអន្លង់ខុស។គ្នានៅតាមបណ្តោយបាតអូរ។ គ្រប់ប្រភេទត្រីជាច្រើនត្រូវបានរកឃើញនៅតាមក្បាលទឹកអូរឆ្លង តាមការរាយការណ៍ថាត្រីពងកូននៅទីនោះភាគច្រើននៅក្នុង ខែ មិថុនា ។

ការធ្វើចរាចរត្រីភាគច្រើនចុះទៅក្នុងផ្នែកខាងក្រោមនៃអូរឆ្លង (ជាទូទៅចាប់ពីខែ កញ្ញា ដល់ ខែ វិច្ឆិកា) ហើយត្រឡប់ចូលទៅក្នុងទន្លេមេគង្គវិញ។ ទោះបីជាយ៉ាងណាក៏ដោយក៏មានប្រភេទត្រីមួយចំនួនរស់នៅតាមអន្លង់ក្នុងអូរឆ្លងដែរ។ ប្រភេទត្រីធំ។ប្រាកដជាស្នាក់នៅរយៈពេលខ្លីនៅអាងភាគខាងក្រោមនៃអូរឆ្លង ហើយត្រីធំ។ទាំងនេះធ្វើចរាចរទៅកាន់ភាគខាងក្រោមនៃអូរឆ្លងមុខគេ។ ប្រភេទត្រីដែលតូចជាង ជាទូទៅស្នាក់នៅរយៈពេលវែងនៅក្នុងអាងនៃអូរឆ្លង ហើយធ្វើចរាចរចុះក្រោមជាមួយប្រភេទត្រីផ្សេងទៀតដោយចាប់ផ្តើមនៅចុងខែ កញ្ញា។

ប្រជាជន

ភ្នងគឺជាជនជាតិដើមភាគតិច។ ទាំងអស់គ្នាជាមួយនឹងក្រុមជនជាតិដើមភាគតិចផ្សេងទៀត ជនជាតិភ្នងមានប្រហែល ៧0% នៃចំនួនប្រជាជននៅក្នុងខេត្តមណ្ឌលគិរី។ ភូមិអណ្តូងក្រឡឹង និងភូមិកាទីមានជនជាតិភ្នងភាគតិចច្រើនជាងគេ ប៉ុន្តែគ្រួសារខ្មែរមួយចំនួនតូចទើបបានផ្លាស់ទីលំនៅទៅរស់នៅក្នុងភូមិទាំងនោះ ដើម្បីលក់ដូរ ឬ ក៏ជាលទ្ធផលនៃការរៀបការជាមួយជនជាតិភ្នង។ ភូមិទាំងពីរ អណ្តូងក្រឡឹង និងភូមិកាទី ត្រូវបានទទួលស្គាល់ជាផ្លូវការថា ភូមិវប្បធម៌ ប៉ុន្តែមានចំនួននៃក្រុមតូច។ជាច្រើនដែលត្រូវបានទទួលស្គាល់ថាជាកន្លែងតាំងភូមិលំនៅរបស់ជនជាតិភ្នងនៅក្នុងសង្គម (មានបីក្រុមនៅក្នុងភូមិកាទី និងប្រាំមួយក្រុមនៅក្នុងភូមិអណ្តូងក្រឡឹង)។ ជាទូទៅរដ្ឋបាលសាធារណៈសំដៅទៅលើកន្លែងតាំងភូមិលំនៅដូចជាក្រុម ឬ ផ្នែក ទោះបីជាជួនកាល

ក្រុមមួយមានកន្លែងតាំងលំនៅដ្ឋានពីរខុសៗគ្នា។ ភូមិរដ្ឋបាលរបស់ភូមិអូរអាមខុសប្លែក ជាសំខាន់ពីភូមិកាទី និងភូមិអណ្តូងក្រឡឹង។ ភូមិអូរអាមមានផ្សារដ៏ធំមួយ និងកន្លែងសំរាប់អន្តោប្រវេសន៍ហើយត្រូវបានចែកចេញជា ១៨ក្រុម ជាមួយគ្រួសារខ្មែរភាគច្រើន (លើសពី ៨២%) និងគ្រួសារស្បែងមួយចំនួន (៦%) ហើយ និងគ្រួសារភ្នង (៨%) ក្នុងការបូកបញ្ចូលជនជាតិដើមភាគតិច វៀតណាមបួនគ្រួសារ និងជនជាតិដើមភាគតិចឡាវប្រាំគ្រួសារ។

ការប្រើប្រាស់ធនធានធម្មជាតិ និងការប្រកបរបរចិញ្ចឹមជីវិត

វប្បធម៌ប្រពៃណីជនជាតិភ្នងឆ្នុះបញ្ចាំងពីការពឹងផ្អែករបស់ពួកគេទៅលើព្រៃឈើ។ យុទ្ធសាស្ត្រនៃការលៃលកដោះស្រាយ និងការប្រកបរបរចិញ្ចឹមជីវិតរបស់ពួកគេគឺផ្អែកទៅលើចំណេះដឹងអេកូឡូស៊ីដ៏ស៊ីជំរៅមួយដែលអនុញ្ញាតិអោយពួកគេយកអត្ថប្រយោជន៍ពីដើមឈើ និងរុក្ខជាតិផ្សេងៗ ត្រី និងសត្វផ្សេងៗទៀត អូរ និង ដី។ ពួកគេបរបាញ់តាមលក្ខណៈប្រពៃណី ចិញ្ចឹមក្របី គោ ជ្រូក មាន់ ឆ្កែ ត្រី នៅក្នុងអូរ និងត្រពាំង ហើយប្រមូលនូវផលិតផលព្រៃឈើផ្សេងៗ សំរាប់ធ្វើម្ហូបសំរាប់ប្រើប្រាស់ក្នុងសំណង់ ឬ ក្នុងការនេសាទ (ឧបករណ៍នេសាទ និង ការបំពុលត្រី) និងក្នុងគោលបំណងផលិតឱសថ។ ព្រៃឈើទើបបានផ្តល់យ៉ាងត្រឹមត្រូវសំរាប់សន្តិសុខ ស្បៀងអាហារជាមួយ និងការប្រែប្រួលដ៏ធំធេងមួយរបស់ផលិតផលដែលអាចធ្វើទៅបានក្នុងរយៈពេលនៃឆ្នាំវិលជុំ។ នៅពេលដែលដំណាំកសិកម្ម ខ្វះខាតដំណាំជំនួសមួយជាញឹកញយអាចត្រូវបានផ្តល់អោយជាឧទាហរណ៍ដំណាំយកមើមតាមធម្មជាតិអាចជាដំណាំជំនួស នៅពេលដែលផលស្រូវថយចុះ ។

សារៈសំខាន់នៃការធ្វើនេសាទ និងការប្រមូលប្រភេទវារីសត្វផ្សេងទៀតត្រូវបានចង្អុលបង្ហាញថា នៅពេលមនុស្សឧទ្ទិសចំពោះសកម្មភាពនេះនឹងអាចរកបាន មានចំនួនច្រើនជាងការចំណាយពេលបរបាញ់សំរាប់ប្រភេទសត្វលើគោក។ ការប្រើប្រាស់សត្វស្រុកគឺត្រូវបានកាត់បន្ថយភាគច្រើនសំរាប់ពិធីបូជាយញ្ញ និងឱកាសផ្សេងៗទៀត។ ដោយជាលក្ខណៈប្រពៃណី ត្រីមិនដែលត្រូវបានលក់ទេ ប៉ុន្តែត្រូវបានចែករំលែក។ សព្វថ្ងៃនេះផលិតផលត្រីកំពុងតែប្រែក្លាយជាទំនិញសំរាប់លក់ដូរ។

ការធ្វើនេសាទ

ជនជាតិភ្នងរស់នៅក្បាលអូរឆ្លងទើបបានប្រើប្រាស់ជាប្រពៃណីនូវឧបករណ៍នេសាទដែលមានចំនួនកំណត់មួយផងដែរ បានប្រែប្រួលទៅនឹងការផ្លាស់ប្តូរធំហួសខ្នាតនៃឧបករណ៍នេសាទ និងវិធីសាស្ត្រដែលបានប្រើប្រាស់នៅក្នុងតំបន់លិចទឹកនៃទន្លេសាប និងទន្លេមេគង្គ។

ការចាត់ថ្នាក់នៃប្រភេទឧបករណ៍នេសាទ ជាប្រពៃណីរួមមានការនេសាទដោយដៃ ឈ្នាង ឆ្នុកដៃមានគំរប សន្ទូចរនង មង សំណាញ់ ប្រព័ន្ធរបាំងតូច លបតូចតាមអន្លង់តូចៗ។ ឧបករណ៍នេសាទដែលគេប្រើញឹកញាប់គឺ មង និង សន្ទូច។

រហូតមកដល់ពេលនេះវិធីសាស្ត្រដ៏សំខាន់ជាងគេនៅក្នុងភូមិភ្នងទើបត្រូវបានកំពុងនេសាទជាមួយនឹងការបំពុលដោយសំបកឈើ។ វិធីសាស្ត្រដែលប្រកបដោយគ្រោះថ្នាក់នេះបានផ្តល់អោយអ្នកភូមិជាមួយនឹងចំនួនត្រីដ៏ច្រើនមួយក្នុងរយៈពេលខ្លីដោយអនុញ្ញាតិអោយពួកគេធ្វើប្រហុក (ជាភាសាភ្នងហៅ "កាអូម")។ ការនេសាទ ជាមួយនឹងការបំពុលដោយសំបកឈើគឺជាផ្នែកមួយនៃមរតកវប្បធម៌របស់ជនជាតិភ្នង។ តាមធម្មតាការប្រើវិធីសាស្ត្រនេះគឺខុសគ្នាបន្តិចបន្តួចក្នុងតំបន់នីមួយៗ ហើយតំរូវអោយមានការយល់ព្រមពីអារក្សអ្នកតា និងការរៀបចំក្រុមដ៏ល្អមួយរបស់មនុស្ស ដើម្បីលៃលកដោះស្រាយជាមួយការងារចំរុះ។ ការបំពុលដោយសំបកឈើទំនងជាទើបបានកំណត់នូវផលប៉ះពាល់បរិស្ថានរយៈពេលវែង ហើយជាធម្មតាពួកគេបានធ្វើអោយខូចខាត និងបាត់បង់នូវប្រសិទ្ធភាពក្នុងរយៈពេល ២៤ ម៉ោង។ ត្រីឆ្ពោរ រ៉ស់ និងប្រភេទត្រីអត់ស្រការភាគច្រើនៗ សត្វវន្តជាតិ ថលជលិកសត្វ និងមនុស្សត្រូវទទួលរងនូវឥទ្ធិពលបន្តិចបន្តួច ដោយសារធាតុធម្មជាតិ ។

សកម្មភាពនៃការនេសាទភាគច្រើនផ្សេងទៀតត្រូវបានធ្វើដោយឯកជន និងគ្មានស្ត្រីចូលរួមលើកលែងតែក្នុងករណីពីរចេញ ដូចជាឈ្នាងត្រូវបានប្រើដោយស្ត្រី និងក្មេងៗ ចំណែកឯសំណាញ់វិញត្រូវបានប្រើដោយបុរសច្រើនជាងប៉ុន្តែបុរសចូលរួមដោយយកចិត្តទុកដាក់ក្នុងសកម្មភាពនេសាទច្រើនជាងស្ត្រី។

ចក្ខុវិស័យពិភពលោក

ជនជាតិភ្នងបានជឿថាសាសនាមានវិញ្ញាណ និងការអនុវត្តន៍ត្រូវបានធ្វើដោយស្រួចស្រាវណាស់ទៅតាមតំរូវការដើម្បីផ្តល់ឱ្យមានការចែករំលែក និងការប្រើប្រាស់ធនធានសំខាន់ឱ្យល្អបំផុត។ តាមទស្សនៈពិភពលោករបស់ជនជាតិភ្នងមនុស្សគឺជាផ្នែកមួយនៃការរស់នៅក្នុងសហគមន៍។ តំលៃនៃសង្គមមានដូចជាការធ្វើតប និងការគោរពគ្នាទៅវិញទៅមក ត្រូវបានអនុវត្តចំពោះមនុស្ស និង សត្វ ហើយ និងទំនាក់ទំនងរវាងមនុស្ស និងមនុស្សផងដែរ។ ទំនាក់ទំនងទាំងនេះត្រូវបានត្រួតពិនិត្យដោយអារក្សអ្នកតាដែលមានទីលំនៅ នៅតំបន់ភ្នំ តំបន់ព្រៃពិសេស ឬ ដើមឈើ ដីច្រាប ទឹកជ្រោះ និងអន្លង់ជ្រៅៗនៅ តាមអូរ ឬ បឹង ។

ទីកន្លែងដែលមានអារក្សអ្នកតាត្រូវបានគេជឿថាទីលំនៅនេះត្រូវបានប្រមូលផ្តុំជាមួយជីវិតសម្ព័ន្ធ និងសក្តានុពលខ្ពស់ដែលនាំមកនូវធនធានធម្មជាតិ។ ជាញឹកញាយពួកគេអាចទទួលរងគ្រោះថ្នាក់ និងជីវិតដែលត្រូវគំរាមកំហែង។ ដើម្បីការពារដល់មនុស្សម្នាក់ៗ និងសហគមន៍ច្បាប់នៃការអនុវត្តន៍ (រួមមានបំរាម) ត្រូវបានបួងសួងដោយកំណត់ពេល ឬ ចំពោះព្រឹត្តការណ៍ជាក់លាក់មួយ។ ពិធីបុណ្យប្រមូលអារក្សអ្នតាបានបង្កើតនូវតម្លាភាព និងសាមគ្គីភាពដែលមាននៅក្នុងសហគមន៍ពិធីនេះមិនមែនជាការបូជាសំងាត់ដោយមនុស្សម្នាក់ៗទេ ប៉ុន្តែត្រូវបានប្រារព្ធឡើងជាព្រឹត្តការណ៍សាធារណៈ។ កាតព្វកិច្ចចំពោះការប្រារព្ធពិធីបុណ្យអារក្សអ្នកតានៅក្នុងកន្លែងដែលនាំមកនូវសក្តានុពលភាពក្នុងការប្រមូលផលដ៏សំបូរបែបជាយថាហេតុ បានតំរូវអោយចែករំលែកផលគ្នា។ វាត្រូវបានគេចាត់ទុកថាមិនអាចធ្វើទៅបានសំរាប់ឯកជនក្នុងការធ្វើការនេសាទធំមួយជាមួយ និងការបំពុលដោយសំបកឈើ លើកលែងតែគាត់ស្ម័គ្រចិត្តចំពោះគ្រោះថ្នាក់ដែលអារក្សអ្នកតាបានដាក់ទោសដល់គាត់ ឬ សហគមន៍។ ដូច្នេះអារក្សអ្នកតាបានជួយសំរួលដល់វិប្បធម៌ និងរាងកាយនៃការបង្កើតឡើង វិញរបស់សហគមន៍ជាស្ថាប័នមួយ ។

ការគ្រប់គ្រងជលផល និងធនធានធម្មជាតិដែលមានលក្ខណៈជាប្រពៃណី ស្ថាប័នគ្រប់គ្រងជាលក្ខណៈប្រពៃណី

ភូមិជនជាតិភ្នងត្រូវបានកំណត់ដោយការបង្កើតភូមិមួយច្បាស់លាស់រួមមានភូមិអ្នកតាមួយ (អ្នកតាថែរក្សា) ព្រំប្រទល់ និងកន្លែងកប់ខ្មោចអ្នកភូមិបានស្គាល់ច្បាស់នូវព្រំប្រទល់ភូមិរបស់ពួកគេ។ អាជ្ញាធរដែលកាន់ប្រពៃណីភ្នងជាមួយតួនាទីដ៏សំខាន់របស់ពួកគេជាអ្នកកាន់កាប់នូវតំលៃនៃវប្បធម៌ក្នុងស្រុកនៅតែមានឥទ្ធិពលជាងអាជ្ញាធររដ្ឋបាលដែលបានតែងតាំងដោយអាជ្ញាធរកំរិតខ្ពស់។ អាជ្ញាធរប្រពៃណីដែលសំខាន់ជាងគេគឺ "មេកន្ត្រាញ" "ចាស់ស្រុក" និងចាស់ទុំ។ រាល់ភូមិទាំងអស់បានបញ្ជាក់ច្បាស់ណាស់នូវចាស់ទុំភូមិដែលតំណាងអោយមាគ៌ានៃគ្រួសារខុសៗគ្នា។ ពួកគេជាមនុស្សសំខាន់ណាស់ក្នុងការចំលងវប្បធម៌ដោយគ្មានសំនេររបស់ជនជាតិភ្នងពីជំនាន់មួយទៅជំនាន់មួយទៀតហើយត្រូវបានផ្ទេរជាមួយ និងអាជ្ញាធរដែលមានកំរិតខ្ពស់។ ជាញឹកញាយពួកគេបានពឹងពាក់ទៅលើចាស់ស្រុកក្នុងការដោះស្រាយទំនាស់ និងផ្តល់នូវការទូន្មានចំពោះក្មេងៗ និងគូស្វាមីដែលទើបរៀបការថ្មីៗ។ អ្នកចាស់ទុំក្នុងភូមិចាស់ស្រុក ។ល។

មានមុខងារនៅក្នុងរចនាសម្ព័ន្ធនៃប្រព័ន្ធរដ្ឋបាលទំនើបរបស់ប្រធានភូមិ និងមេឃុំ។ ថ្មីៗនេះជម្លោះរវាងជំនាន់មិនហាក់ដូចជាសំខាន់ណាស់ណាទេ សូម្បីតែជំនាន់ក្រោយមានការចាប់អារម្មណ៍ខុសៗគ្នាជាងចាស់ទុំក៏ដោយ។ ច្បាប់ទំលាប់មិនបានរួមបញ្ចូល ប៉ុន្តែត្រូវបានផ្អែកទៅលើកាតព្វកិច្ចចំពោះបុព្វជន ឬអារក្សអ្នកតា។ បំរាម និងវិន័យក្នុងការគោរពចំពោះអំពើរបស់អារក្សអ្នកតាដូចជាការធ្វើអោយញាញើត និងត្រូវបង្ខាប់ដោយមនុស្សចាស់ ។

ច្បាប់គ្រប់គ្រងជលផលដែលមានលក្ខណៈជាប្រពៃណី

សិទ្ធិ និងការចូលរក គឺជាធាតុសំខាន់នៃការគ្រប់គ្រងជលផល។ វិធានការក្នុងការគ្រប់គ្រងជលផល ត្រូវបានបញ្ចុះទៅក្នុងសាវតាវប្បធម៌ (ចក្ខុវិស័យពិភពលោក ប្រព័ន្ធចំណេះដឹង ទំនៀមទំលាប់ ជំនឿសាសនា ប្រពៃណី ។ល។) នៃចំណេះ ដឹងរបស់ជនជាតិភ្នង។

ការគ្រប់គ្រងដលផលដែលមានលក្ខណៈជាប្រពៃណីរួមមានគោលបំណង និងវិធានការធ្វេសប្រហែស។ ការអនុវត្តន៍និងបំរាមទាក់ទងទៅនឹងការធ្វើអោយធូរស្រាលរបស់អារក្សអ្នកតា និងការពារសហគមន៍ពីការរងទុក្ខទណ្ឌកម្មដោយអារក្សអ្នកតាដែលអាចត្រូវបានមើលឃើញដូចវិធានការគ្រប់គ្រងដែលពួកគេដាក់កិរិតដោយផ្ទាល់ចំពោះការចូលទៅរកធនធាន និងឥទ្ធិពលទៅលើនិរន្តរភាពរបស់ពួកគេ។

ការចូលទៅរកក្នុងដែននេសាទ ត្រូវបានអនុញ្ញាតិដូចជាការបង្កើតច្បាប់នៃការអនុវត្តន៍ជាមួយនឹងការគោរពចំពោះប្រភេទដែននេសាទខុសៗ គ្មានរួមមានច្បាប់នៃការគោរពចំពោះអារក្សអ្នកតាមានការទាក់ទងទៅនឹងការធ្វើឱ្យធូរស្រាលដល់អារក្សអ្នកតា។ ក្នុងគោលការណ៍សំខាន់ ការចូលទៅរកត្រីត្រូវអនុញ្ញាតិចំពោះអ្នករាល់គ្នាដែលធ្វើតាមច្បាប់ទាំងនេះ។

ការធ្វើនេសាទឯកជនត្រូវបានអនុញ្ញាតិនូវគ្រប់ទីកន្លែង លើកលែងតែក្នុងតំបន់ដែលបានបម្រុងសំរាប់ការនេសាទរួមជាមួយនឹងការបំពុលដោយសំបកឈើ និងតំបន់ដែលនៅជិតៗ។ វិធានការនេះបានបកប្រែទៅតាមភូមិសាស្ត្រដែលកំណត់នូវសំពាធទៅលើធនធាន។ តំបន់ជិតៗជាញឹកញាយគឺជាអន្លង់ជ្រៅៗដែលភ្ជាប់ជាមួយជ្រោះ។ ការរស់នៅរបស់ពួកគេបានកំណត់នូវការខិតខំនេសាទ និងជួយសំរួលដល់ការស្តុក ការជ្រើសរើស និងការទាញយកមកវិញផលត្រី។ បំរាម និងច្បាប់នៃការអនុវត្តន៍ដែលទាក់ទងទៅនឹងការសំដែងនៃភាពរមទមល្យ និងការគោរពចំពោះធម្មជាតិក្នុងខណៈដែលគុណប្រយោជន៍យកបានមកពីធម្មជាតិដ៏ធំទូលាយ។ ការដាក់កិរិតឧបករណ៍សំខាន់ៗគឺស្ថិតនៅលើកិរិតនៃសារធាតុធម្មជាតិដែលបានប្រើនូវក្នុងការបំពុល។ ដោយត្រូវបានបង្ហាញនូវវិធីសាស្ត្រនេសាទដែលបំផ្លាញខ្លាំងដូចជា ការសំលាប់ដោយប្រើអគ្គិសនី ការបំពុលដោយថ្នាំគីមី ការគប់គ្រាប់បែក និងការប្រើមងស្បៃមុងខ្លួត្រូវបានបដិសេធ និងមិនយល់ព្រមដោយអាជ្ញាធរប្រពៃណី។ គោលការណ៍សំខាន់នៃការចែករំលែកផលិតផលព្រៃដោយមានប្រសិទ្ធិភាពបានបកប្រែទៅក្នុងការប្រើប្រាស់ធនធានធម្មជាតិដោយសន្សំសំចៃ រួមមានត្រី។ ទីកន្លែងពិតប្រាកដដែលរួមមានមនុស្សមួយចំនួនអាចចូលទៅបំពុលត្រីដែលធ្វើតាមការបូជាយញ្ញចំពោះអារក្សអ្នកតាស្រុក។ ការបូជាយញ្ញគឺជាផ្នែកទាំងមូល នៃសកម្មភាពនេសាទនៅក្នុងតំបន់ទាំងនេះ។ ការបូជាយញ្ញនេះត្រូវបានតាំងចិត្តដើម្បីផ្តល់សំរាប់ការចាប់ត្រីឱ្យបានច្រើនប៉ុន្តែបានកំណត់នូវកិរិតនៃការនេសាទផងដែរដោយបុគ្គលម្នាក់ៗពីព្រោះតំលៃត្រូវបានកកើតឡើងដោយការធ្វើវិនិយោគនៅក្នុងពិធីបុណ្យអារក្សអ្នកតា។

គ្រោងការច្បាប់ជាផ្លូវការ

គ្រប់សកម្មភាពនៃការធ្វើនេសាទទាំងអស់ធ្វើឡើងនៅក្នុងដែននេសាទទឹកសាប គឺជាប្រធានបទមួយផ្តោតទៅលើច្បាប់ជលផលនៃព្រះរាជាណាចក្រកម្ពុជាក្នុងឆ្នាំ ១៩៨៧។ នាយកដ្ឋានជលផលជាអ្នកទទួលខុសត្រូវក្នុងការអភិវឌ្ឍន៍នៃគោលនយោបាយជលផលត្រួតពិនិត្យ និងការអនុវត្តន៍របស់ពួកគេ។ សេចក្តីព្រាងអនុក្រឹត្យនៃការអភិវឌ្ឍន៍សហគមន៍នេសាទ បានដាក់ការសង្កត់យ៉ាងខ្លាំងទៅលើច្បាប់របស់នាយកដ្ឋានជលផលក្នុងការជួយសំរួលសហគមន៍ជលផល។

ការសិក្សានៅក្នុងតំបន់នេះត្រូវបានដាក់ទីតាំងសំខាន់ៗដែលមាននៅក្នុងតំបន់អភិរក្សជីវៈចំរុះ "សីមា" ។

រដ្ឋបាលព្រៃឈើបានទទួលបន្ទុកសំរាប់ការគ្រប់គ្រងតំបន់ហើយធានាអះអាងថាតំបន់នេះត្រូវបានប្រើប្រាស់ដោយនិរន្តរភាពសំរាប់ការអភិវឌ្ឍន៍ និងការប្រកបរបរចិញ្ចឹមជីវិតរបស់សហគមន៍ក្នុងតំបន់នេះ។ ច្បាប់ដីធ្លី (មាត្រា ២៣-២៨ និងមាត្រា ១៣៨-១៤១) បានផ្តល់អោយប្រជាជនមូលដ្ឋាននូវសិទ្ធិដើម្បីរស់នៅក្នុងតំបន់នេះ។

និន្នាការថ្មីៗនេះ

ការសិក្សានេះត្រូវបានធ្វើឡើងនូវរិបត្តិថ្មីៗ។ ការប្រកបរបរចិញ្ចឹមជីវិតរបស់ជនជាតិភ្នងទើបបានជះឥទ្ធិពលដោយកត្តាខាងក្រៅ ចូលមកត្រួតពិនិត្យសហគមន៍របស់ពួកគេ។ បញ្ហា ចំបង២ពីរសំរាប់ស្ថានភាពនេះរួមមាន: ការធ្វើតាម និងសម្ពាធ ទៅលើធនធាន។

ការធ្វើតាម

ការថ្លែងនូវសំដីអះអាងនៃការត្រួតពិនិត្យទៅលើតំបន់ជនជាតិភ្នង និងតំបន់អន្តោរប្រវេសន៍របស់អ្នកខាងក្រៅ (ជាពិសេសនៅភូមិអូរអាម និងភូមិឆ្នែង) ទើបបានបកប្រែ

ចូលទៅក្នុងការធ្វេសប្រហែសសំរាប់តំលៃ វប្បធម៌របស់ពួកគេ ការធ្វើបាបការបំផ្លាញសត្វព្រៃយ៉ាងច្រើនការបាត់បង់ដើមដំរ និងដីធ្លី ហើយនិងការតាមជំនឿចំពោះច្បាប់ជាតិ ដែលបានធ្វើបន្តិចបន្តួច ឬ មិនពិចារណាសំរាប់រចនាបថជីវិត និងតំរូវការសំរាប់ប្រកបរបរចិញ្ចឹមជីវិត។

ជារឿយៗ ជនជាតិភ្នងបានសំដែលនូវអារម្មណ៍នៃការរាប់អានដូចជាមនុស្សថ្នាក់ទីពីរដោយសមាគមខ្មែរ មានអានុភាពលើ។ ប្រសិទ្ធិភាពនេះទើបត្រូវបានធ្វើអោយរឹតតែខ្លាំងឡើងដោយទំនាក់ទំនងដ៏សំខាន់ និងការចូលទៅដល់ទីផ្សារ។ ការលុក-លុយនៃបេសកកម្មគ្រិស្តសាសនាឈ្លានពានទើបបានដឹកនាំការផ្សព្វផ្សាយជំនឿសាសនា ដែលមិនទាក់ទងទៅនឹងអេកូឡូស៊ី ព្រៃឈើដូចជា ជំនឿប្រពៃណីរបស់ជនជាតិភ្នងដែលមានស្រាប់។ ម្យ៉ាងទៀតដំណើរការទូទាំប្រទេសនៃគោលនយោបាយ និងរដ្ឋបាលវិមជ្ឈការដែលសង្កត់ទៅលើការធ្វើអោយរឹងប៉ឹងនូវក្រុមប្រឹក្សាឃុំ) ទើបបានដឹកនាំទៅរកការធ្វើមជ្ឈការដែលមានការកើនឡើងនៅក្នុងសហគមន៍ជនជាតិភ្នងកន្លែងសំរាប់ភូមិដែលមានគោលបំណងច្រើនជាងគេមានភាពរឹតរឿបចំខ្ពស់ជាងគេខាងប្រពៃណី។ ការអនុវត្តន៍អភិបាលកិច្ចមិនសុក្រឹត្យបានប៉ះពាល់ជាអវិជ្ជមានទៅលើធនធានធម្មជាតិខ្លួនឯងផ្ទាល់ និងដំណើរការគ្រប់គ្រងធនធានធម្មជាតិផងដែរ ដែលពឹងពាក់ទៅលើការភ្ជាប់ទំនាក់ទំនងជាមួយប្រជាជន និងស្ថាប័នទៅតាមភាពរឹតគ្រប់គ្រងផ្សេងៗគ្នា។

សម្ពាធទៅលើធនធាន

ការបាត់បង់ដើមដំរទឹកដ៏ធ្ងន់ធ្ងរ (ហើយ និងការបាត់បង់ប្រាក់ចំណូលដ៏សំខាន់ដូច្នេះ) ក្នុងការកាប់ឈើ ដែលជាគន្លឹះនៃលំដាប់សំណង ដែលមាននិន្នាការទៅរកក្រុមជនជាតិភ្នង រួមមានការជួញដូរដំរទឹក និងផលិតផល អនុផលព្រៃឈើ ផ្សេងទៀតធ្វើអោយរឹតតែខ្លាំងឡើងៗសកម្មភាពបរបាញ់កើនឡើង និងការរីកឡើងនៃធនធានដំណាំកសិកម្ម និងប្រាក់ឈ្នួលកម្មករ។

លើសពីនេះទៅទៀត ជនជាតិភ្នងបានភ្ជាប់ទំនាក់ទំនងយ៉ាងខ្លាំងទៅក្នុងសកម្មភាពខុសច្បាប់ដូចជាការកាប់ឈើ ការបរបាញ់ និងការនេសាទដោយឧបករណ៍នេសាទដែលមានការបំផ្លាញខ្លាំង។ ការគប់គ្រាប់បែកការសំលាប់ត្រីដោយអគ្គិសនី ការនេសាទជាមួយការដាក់ថ្នាំបំពុលគីមីដ៏ខ្លាំងក្លា ជាទូទៅត្រូវបានគេហៅថា (អង់ទ្រីន) និងលូស្បៃមុង (ឌូ) ត្រូវបានប្រើដោយជនជាតិចាម និងខ្មែរអ្នកចំណូលថ្មី ជនជាតិវៀតណាមដែលបរបាញ់ ឬ នេសាទខុសច្បាប់ និងជនជាតិភ្នងផ្ទាល់ ទើបបានចាប់ផ្តើមអនុវត្តជាមួយនឹងអាគុយឆក់ និងឌូ។

លទ្ធផលនេះបានធ្វើអោយមានសំណើកដ៏ធន់ធរនៃការអនុវត្តន៍អភិរក្សប្រពៃណី។

សកម្មភាពនេសាទខុសច្បាប់មិនត្រូវបានកំណត់ទៅក្នុងការសិក្សានេះទេ ប៉ុន្តែឆ្លងកាត់ពាសពេញគ្រប់ទីកន្លែងនៃអូរនេះ។ សូម្បីតែ ប្រសិនបើប្រជាជននៅក្នុងតំបន់សិក្សានេះទទួលនូវជោគជ័យក្នុងការគ្រប់គ្រងជលផលរបស់ពួកគេនៅក្នុងមធ្យោបាយដ៏មាននិរន្តរភាពមួយក៏ដោយក៏ការងារជលផលអាចនៅតែត្រូវបានគេបោសសំអាតចេញប្រសិនបើការស្តុក និងទីជំរកនៃត្រីនៅភាគខាងក្រោមនៃអូរត្រូវបានបំផ្លាញ។ ជាមួយនឹងអវត្តមាននៃនាយកដ្ឋានជលផលក្នុងខេត្តមិនមានភ្នាក់ងាររដ្ឋាភិបាល ដែលមានអណត្តិច្បាស់លាស់មួយ និងសមត្ថភាពគ្រប់គ្រាន់ដើម្បីទប់ស្កាត់ការនេសាទខុសច្បាប់។

ផលវិបាកសំរាប់ការគ្រប់គ្រង

មានចន្លោះមួយរវាងច្បាប់ជលផល និងលក្ខន្តិក: ជាផ្លូវការដែលផ្តល់នូវគំរោងការសំរាប់ការគ្រប់គ្រងជលផលទូទាំងប្រទេស និងអ្នកបច្ចេកទេសគ្រប់គ្រងប្រពៃណីដែលទើបបានអភិវឌ្ឍន៍ជាច្រើនសតវត្ស។ ហើយនិងការមកដល់ថ្មីៗ អន្តោប្រវេសន៍ និងកងកំលាំងប្រដាប់អាវុធប្រហាក់ប្រហែលគ្នា) កំពុងតែប្រកួតប្រជែងដោយផ្ទាល់ជាមួយនឹងជនជាតិដើមសំរាប់ការប្រកបរបរចិញ្ចឹមជីវិត និងការនេសាទដែលមានលក្ខណៈជួញដូរ។

ការកំណត់សមត្ថភាពរបស់ក្រុមឈ្មាតដើម្បីអនុវត្តច្បាប់រួមជាមួយនឹងការកើនឡើងមួយក្នុងសកម្មភាពនេសាទខុសច្បាប់នាំឱ្យមានដំណើរការកើនឡើងនៃសំណើររបស់តំលៃវប្បធម៌ជនជាតិភ្នង និងរបបគ្រប់គ្រងជលផលដែលមានលក្ខណៈជាប្រពៃណីរបស់ពួកគេ។ ភាពទន់ខ្សោយទូទៅនៃការគ្រប់គ្រងទៅលើអនុភាពនៃសង្គមគឺត្រូវបានបន្សល់ទុកយ៉ាងខ្លាំងក្លាដោយអ្នកភូមិជនជាតិភ្នងតាំងពីពេលដែលពួកគេមានបទពិសោធន៍តិចតួច និងភាពជឿជាក់ក្នុងការការពារពួកគេផ្ទាល់

ជាងទង្វើរបស់អ្នកដទៃ។ សមត្ថភាពរបស់ជនជាតិភ្នងចំពោះការធ្វើឱ្យរឹងមាំឡើងវិញនូវតំលៃនៃវប្បធម៌ និងយុទ្ធសាស្ត្រក្នុងការប្រកបរបរចិញ្ចឹមជីវិតរបស់ពួកគេ និងកំណត់នូវលទ្ធភាពរបស់ពួកគេក្នុងការការពារតំបន់ដីបុព្វបុរសរបស់ពួកគេ និងធនធានរបស់វាពីអ្នកមកពីខាងក្រៅ។
សំរាប់ថ្ងៃអនាគត សិនណារីយ៉ូ ៣ នៃការអភិឌ្ឍន៍ដែលអាចធ្វើទៅបាន អាចត្រូវបានគេគិតឃើញថា:

សិនណារីយ៉ូទី១: វប្បធម៌របស់ជនជាតិភ្នងកំលាំងស្អិតជាប់ជាសង្គម និងប្រព័ន្ធតំលៃរបស់ពួកគេមានកំលាំងគ្រប់គ្រាន់ដើម្បីរស់ និងអាចបត់បែនបានគ្រប់គ្រាន់ដើម្បីបន្សាំទៅនឹងស្ថានភាពខាងក្រៅ។ ប្រការនេះនឹងដឹកនាំទៅរកការកែប្រែដែលឈានចូលដល់ការប្រមូលផលជាមួយនឹងស្ថានភាពថ្មីៗ ឬនិន្នាការថ្មីៗក្នុងខណៈដែលការថែរក្សាអ្នកអភិរក្សនៃទស្សនៈប្រពៃណីរបស់ពួកគេដែលប្រើប្រាស់ធនធានធម្មជាតិ រួមមានត្រី។ អាចមានជាវិជ្ជមាននូវប្រសិទ្ធិភាពសាយភាយទៅលើអន្តោប្រវេសន៍ និងសង្គមស៊ីវិល។

សិនណារីយ៉ូទី២: សហគមន៍ជនជាតិភ្នងសុខចិត្តចាញ់ចំពោះសំពាធមកពីខាងក្រៅ និងចូលរួមទៅក្នុង "ការប្រណាំងប្រជែងក្នុងការចាប់ត្រី"។ ដោយជាផលវិបាកប្រព័ន្ធនៃការគ្រប់គ្រងជលផល និងតំលៃប្រពៃណីរបស់ពួកគេបានលិចបាត់។

ជនជាតិភ្នង និងជនជាតិភាគតិចផ្សេងទៀតនឹងត្រូវតែប្រកួតប្រជែងជាមួយអ្នកមកពីខាងក្រៅ ប៉ូលីស និងទាហាន។ វប្បធម៌របស់ពួកគេនឹងលិចបាត់ជាលំដាប់។

សិនណារីយ៉ូទី៣: សិនណារីយ៉ូនេះគឺជាចំណុចកណ្តាលរវាងពីសិនណារីយ៉ូទី១ និងទី២។ វប្បធម៌នៃជនជាតិដើមទទួលសេចក្តីវិនាសពីឥទ្ធិពលខាងក្រៅ ហើយពួកគេបានចូលរួមទៅក្នុង "ការប្រណាំងប្រជែងក្នុងការចាប់ត្រី"។ អ្នកនេសាទជនជាតិដើម យកលំនាំតាមការនេសាទជាលក្ខណៈថ្មីៗ នៅពេលដែលមានការថែរក្សាយ៉ាងទូលាយនូវតំលៃប្រពៃណីរបស់ពួកគេ។

អនុសាសន៍

ផ្អែកទៅលើការរកឃើញនៃការសិក្សារូបមន្តដំបូងនៃអនុសាសន៍រួមមាន:

❐ រាល់ការខិតខំប្រឹងប្រែងដើម្បីសម្របសម្រួលការគ្រប់គ្រងធនធានឱ្យមាននិរន្តរភាព ទាមទារបញ្ចាក់នូវការគ្រប់គ្រងនៅក្នុងតំបន់នៃកន្លែងដែលមានសកម្មភាពរួមមានវិន័យនៃច្បាប់ផ្សេងៗ តម្លាភាព និងភាពដែលអាចទទួលខុសត្រូវបាន។ ដោយធ្វើអោយប្រសើរឡើងនូវការគ្រប់គ្រងបរិស្ថានក្នុងតំបន់គោលដៅដែលនឹងត្រូវតែដាក់អោយពេញលេញទៅក្នុងបញ្ជីលក្ខណៈពិសេសរបស់ជនជាតិភ្នង និងជនជាតិដើមភាគតិចផ្សេងៗ ទៀតផងដែរ។

❐ ការខិតខំប្រឹងប្រែងទាំងនេះត្រូវបានគេធ្វើឡើងដើម្បីស្វែងយល់ និងអះអាងសារជាថ្មីនូវការគ្រប់គ្រងប្រពៃណីដែលបន្សល់ទុក និងប្រព័ន្ធចំណេះដឹងជាយថាហេតុដើម្បីសម្របសម្រួលទៅក្នុង និងបានអនុវត្តចំពោះការអភិវឌ្ឍន៍ក្នុងស្រុក និងការគ្រប់គ្រងមូលដ្ឋានសហគមន៍ដែលមាននៅក្នុងសហគមន៍នីមួយៗនៅលើតំបន់ដ៏ទូលាយជាងនេះ ឬ នៅក្នុងអាងនៃអូរទាំងស្រុង។ រដ្ឋអំណាចនៅក្នុងស្រុក និងភ្នាក់ងារគ្រប់ជាន់ថ្នាក់ គួរតែត្រូវបានជួយក្នុងការធ្វើអោយប្រសើរឡើងនូវការយល់ដឹង និងការពិចារណារបស់ជនជាតិភ្នងវប្បធម៌ និងប្រពៃណីរបស់ពួកគេ ដើម្បីពង្រីកនូវការកំណត់វប្បធម៌ និងអាជ្ញាធរ ប្រពៃណីរបស់ជនជាតិភ្នង។ រដ្ឋអំណាច (ថ្នាក់តំបន់ និងថ្នាក់ជាតិ) ត្រូវទទួលស្គាល់នូវភាពស្របច្បាប់នៃសិទ្ធិរបស់ជនជាតិដើមភាគតិចចំពោះដីបុព្វបុរសរបស់ពួកគេការគ្រប់គ្រងប្រព័ន្ធប្រពៃណីរបស់ពួកគេ និងស្ថាប័នវប្បធម៌ និងសង្គមរបស់ពួកគេ។ ដោយកំណត់ជាក់លាក់ចំពោះ :

-ការចូលរួមស្រាវជ្រាវគួរតែត្រូវបានធ្វើនៅលើស្ថាប័នប្រពៃណី និងអាជ្ញាធរប្រពៃណីរបស់ជនជាតិភ្នង

-ការប្រើប្រាស់ភាសាភ្នងគួរត្រូវបានលើកតំកើងតាមរយៈសំភារៈសោតទស្សន៍នៅក្នុងភាសាភ្នងនិងការផ្តល់នូវឱកាសសំរាប់មន្ត្រីសមាគមអភិរក្សសត្វព្រៃដើម្បីរៀនភាសានេះ។

-អាជ្ញាធរប្រពៃណីគួរតែត្រូវបានពង្រឹងដោយឧបត្ថម្ភនូវការបង្រៀនជំនាន់ក្រោយ ។

-ការធ្វើអន្តរាគមន៍ពីខាងក្រៅដែលអាចបំផ្លាញការកំណត់វប្បធម៌ជនជាតិភ្នង (ជាពិសេសបេសកកម្មរបស់អ្នកកាន់សាសនាគ្រិស្ត) គួរត្រូវរក្សាអោយបានជោគជ័យ។ ការប្រជុំគួរត្រូវបានរៀបចំសំរាប់ប្រជាជនមកពីតំបន់ខុសៗគ្នាអោយឈានដល់ការយល់ដឹងជាធម្មតាទៅលើប្រព័ន្ធនៃការគ្រប់គ្រងប្រពៃណី។

-ជនជាតិភ្នងគួរត្រូវបានជួយ ដើម្បីរៀបចំជាឯកសារនូវប្រព័ន្ធនៃការគ្រប់គ្រងប្រពៃណីរបស់ពួកគេ ក្នុងមធ្យោបាយមួយដែលប្រកបដោយការប្រើប្រាស់ចំពោះពួកគេ និងអនុញ្ញាតិអោយពួកគេដើម្បីធ្វើអោយប្រសើរឡើង សម្របសម្រួល និងអនុវត្តប្រព័ន្ធទាំងនេះចំពោះលក្ខខណ្ឌផ្លាស់ប្តូរដែលមាននៅក្នុងសហគមន៍របស់ពួកគេ។

-ការចូលរួមសកម្មភាពស្រាវជ្រាវ គួរត្រូវបានធ្វើទៅលើប្រព័ន្ធនៃការគ្រប់គ្រងធនធានធម្មជាតិដែលមានលក្ខណៈ

ជាប្រពៃណីរបស់ជនជាតិភ្នងយោងទៅលើត្រី និងធនធានផ្សេងៗទៀត ។

-សហគមន៍ជនជាតិភ្នងគួរត្រូវបានជួយនៅក្នុងការធ្វើផែនទីដែននេសាទ ផែនទីតំបន់អារក្សអ្នកតា និងផែនទីតំបន់ធនធានសំខាន់ៗ ជាពិសេសផែនទីអន្លង់ជ្រៅៗ ។

-ការប្រើប្រាស់នៃការបំពុលដោយសំបកឈើគួរតែត្រូវបានអះអាងថាជាការនេសាទដែលមានន័យចំពោះបរិស្ថានមួយ។

-ចំណេះដឹងជាផ្លូវការនៃសិទ្ធិរបស់ជនជាតិភ្នងដើម្បីគ្រប់គ្រងជលផលរបស់ពួកគេដោយយោងទៅលើប្រព័ន្ធប្រពៃណី និងមិនរាប់បញ្ចូលនូវអ្វីផ្សេងទៀតដែលត្រូវស្វែងរក។

-សហគមន៍ជនជាតិភ្នងគួរត្រូវបានជួយការពារដីរបស់ពួកគេពីការដណ្តើមយកដី និងការដាក់ឈ្មោះដីដែលមានលក្ខណៈជាប្រពៃណីរបស់ពួកគេ (រួមមានដែននេសាទ) ដោយផ្តោតទៅលើការប្រុងស្មារតីចំពោះឯកតាភូមិ ប្រពៃណីជំនួសដោយភូមិរដ្ឋបាលជាកន្លែងដែលពួកគេស្ថិតនៅខុសៗគ្នា។

❐ ដំណោះស្រាយមូលដ្ឋានសិទ្ធិចំពោះការគ្រប់គ្រងធនធាន គួរត្រូវបានធ្វើដើម្បី ដឹកនាំទៅរកការរបៀបវិរៈអភិវឌ្ឍន៍។ ការពិគ្រោះយោបល់របស់សហគមន៍គួរតែជាកាតព្វកិច្ចសំរាប់គ្រប់គំរោងអភិវឌ្ឍន៍ ដែលអាចប៉ះពាល់ជាអវិជ្ជមានទៅលើសហគមន៍ជនជាតិដើមភាគតិច និងការប្តេជ្ញាដោយផ្ទាល់របស់ពួកគេគួរត្រូវបានលើកតំកើង ។

❐ ដំណោះស្រាយចំពោះការគ្រប់គ្រងធនធានធម្មជាតិគួរត្រូវបានរុករក។ ដោយហេតុតែការទទួលស្គាល់គួរត្រូវបានផ្តល់ចំពោះស្ថាប័នគ្រប់គ្រងក្នុងតំបន់ និងពួកគេគួរដើរតួនាទីកណ្តាលក្នុងគំរោងនៃការគ្រប់គ្រង ។

1 INTRODUCTION

1.1 Background

The Southern Mondulkiri Biodiversity Conservation Project (SBCP), in Eastern Cambodia, is jointly implemented by the Wildlife Conservation Society (WCS) and the Forestry Administration (FA) and operated under the overall management of the Ministry of Agriculture, Forestry and Fishery (MAFF). It is in an upland forested area of over 300,000 ha along the international border with Viet Nam and has been in place since 2000. The project area is located within a vast, recently suspended,commercial logging concession, and is of exceptional international importance for biodiversity conservation.

The overall aim of the Project is to promote suitable land-use systems that allow for effective conservation of wildlife and key resources. Thus, much of the work of the project focuses on helping the Punong[1] communities to explore land-use patterns and livelihood strategies that allow for sustainable social and economic reproduction and, at the same time, for biodiversity conservation.

The Project implements a wide range of practical conservation measures, the three most notable being:

- law enforcement to prevent illegal settling and overuse of resources by both villagers and outsiders,
- a programme of participatory land-use planning in Punong villages, and
- a support programme of applied research, examining both human resource use and wildlife popu lation trends.

Recent studies on livelihoods and natural resource management (NRM) indicate that local people strongly depend on fish for food security, as the main source of animal protein (exceeding by a large amount the animal protein derived from wildlife or husbandry) and an important source of cash income[2].

During the last few years fish resources have come increasingly under pressure and drastic declines in fish catches are reported (Richardson 2003, Huol 2004). A variety of causes are suggested for this trend, including intensified use of illegal and environmentally unsound fishing gears and encroachment of outsiders into traditional fishing grounds and forest lands of Punong villages. A continued loss of fisheries resources could increase the pressure on other resources which are equally vital for the livelihoods of the Punong people.

1.2 The study

In order to identify opportunities and strategies for the sustainable utilization of aquatic resources, an in-depth and holistic understanding of the ecological, social and political context of the fisheries is required. To this end, the study on "Upland fishing and Indigenous Punong Fisheries Management in Southern Mondulkiri Province" was commissioned by WCS. The study focused on three administrative villages[3] in the Southern Mondulkiri Landscape Project: O Am, Kati and Andong Kroloeng, which were subject to previous interventions by WCS (see Table 1 & Maps 1 & 2). The study was conducted by a team comprising field researchers, an

[1]or Pnong, however, it is considered that the word Punong is closest to the peoples' self-denomination.
[2]Richardson 2003, Evans et al. 2003, Huol 2004, Walston 2004
[3]Throughout the document a distinction is made between "administrative villages" and "Punong village". The composition of an administrative village is result of an external decision of Cambodian public administration and commonly consists of various sectors (krom). Andong Kroloeng administrative village, for example, consists of 6 kroms; each krom is a Punong village with its distinctive name (self-denomination), history, boundaries, traditional resource use rights, and relationships to neighboring Punong villages. O Am is the biggest administrative village and of relatively recent formation and intensive influx of migrants; as a consequence, inhabitants identify the location of their houses with the administrative number of krom, rather than by village name.

officer of the Inland Fisheries Research and Development Institute (IFReDI) of the Department of Fisheries and a Punong language translator[4]. The study had a duration of ten weeks, including 14 person/weeks of field research from August to October 2004 (during the "wet season"), and focused on the following issues:

- social and ecological setting,
- practice of fishing operations,
- fisheries as part of natural resources management structures,
- historical dimension, and
- economic and social trends and their implications for NRM.

Map 1: Overall study area

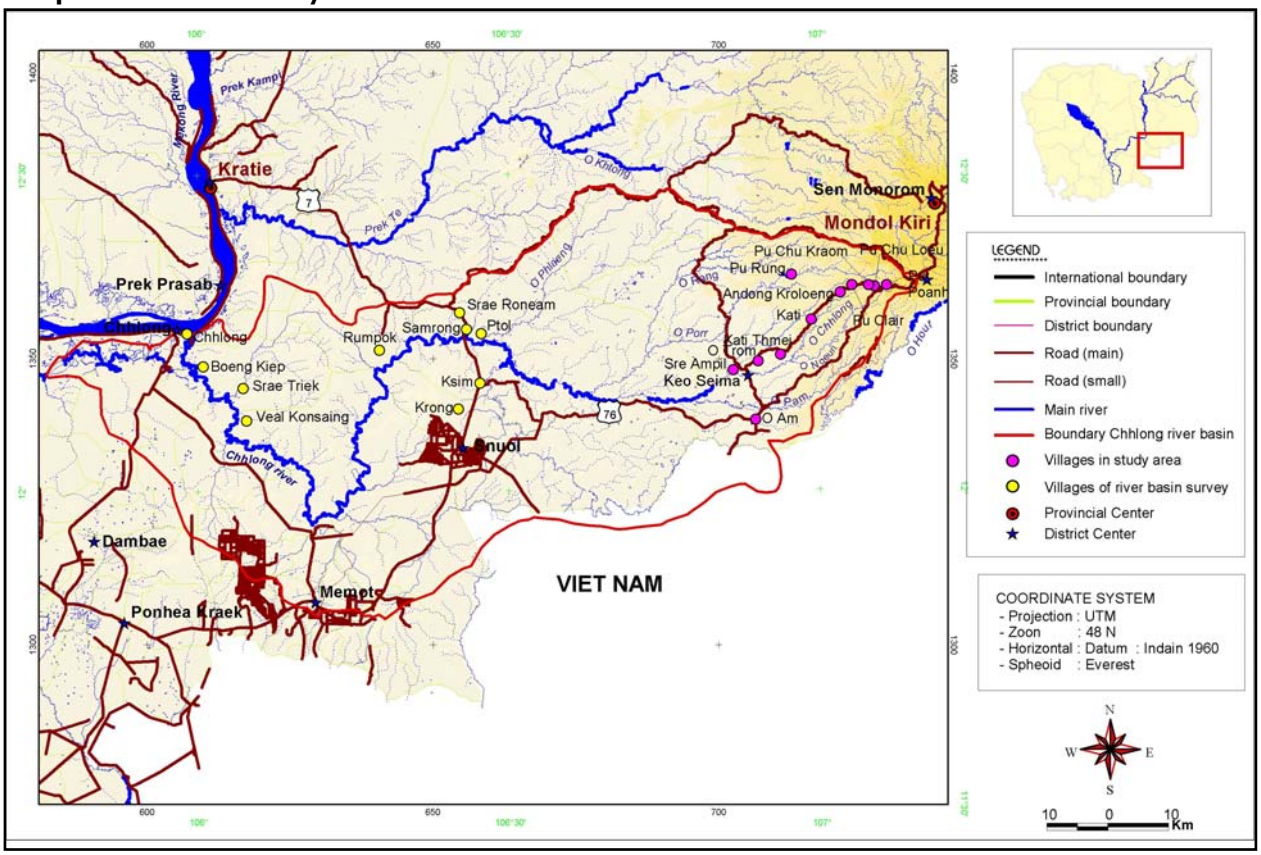
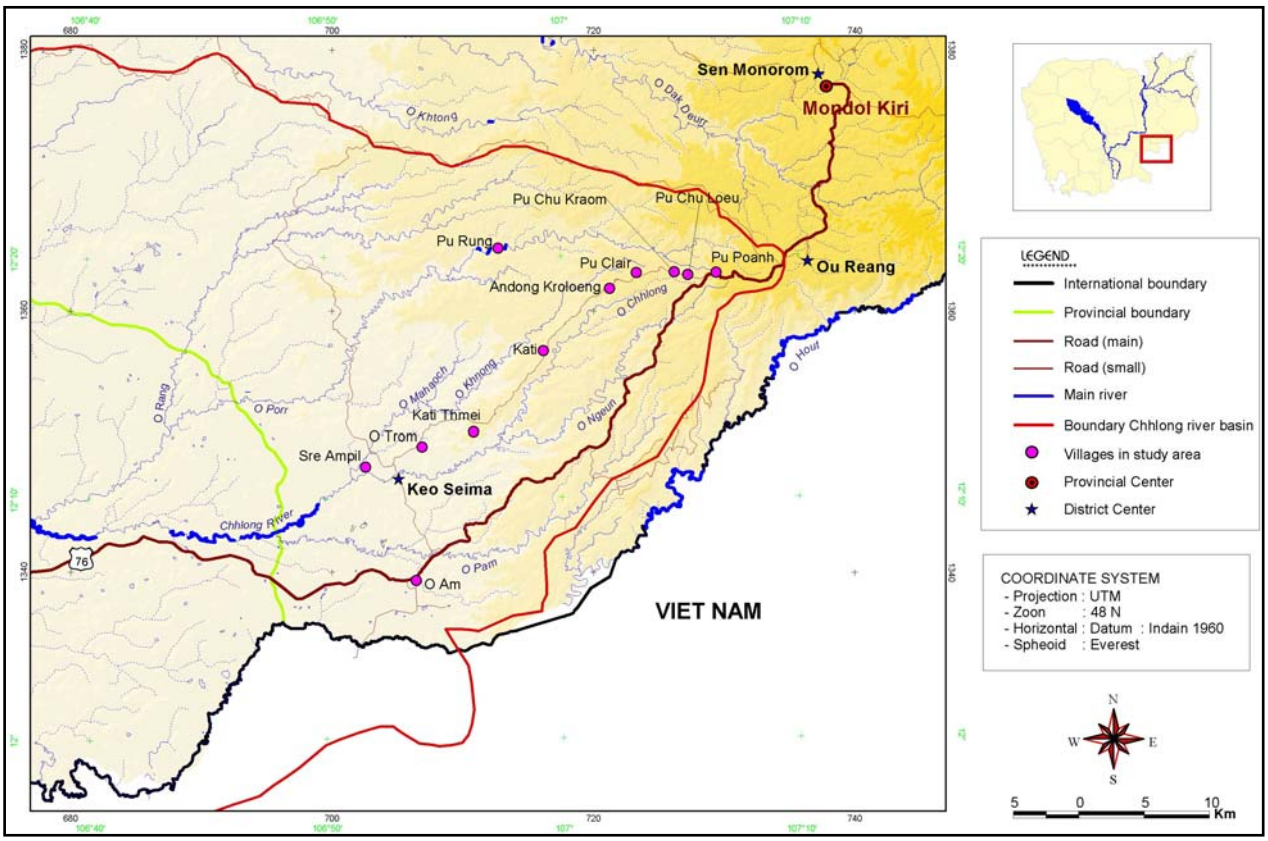


Table 1: *Application of fishing gear census in study area*

Administrative village	Total population (in sectors covered)	Punong village or sector	Total No. of households	No. of households censused	% of households censused
Andong Kroloeng	390	Pu Poanh	12	9	75%
		Pu Chu Loe + Kraom	32	32	100%
		Pu Clair	5	5	100%
		Andong Kroloeng	12	12	100%
		Pu Rung	12	12	100%
Kati	266	Kati	31	31	100%
		Daem Beng	5	5	100%
		O Tron	8	8	100%
O Am	547	Sector No.4	13	12	92%
		Sector No.10	46	35	76%
		Sector No.11	24	21	87%
		Sector No.16	27	22	81%
Total	1203		227	204	90%

[4]Field researchers: Peter Degen and Peter Swift; fisheries officer: Chap Piseth; translator: Hang Mary

Map 2: Intensively studied area



The study, in line with the overarching goal of WCS' intervention, follows the overall objective of "sustainable fisheries management as part of an integrated natural resource management scheme shared by resource users and supporting agencies at various levels". Its immediate objective is to " provide an initial understanding of the role of fisheries in selected communities in the landscape area that will allow for the integration of upland fisheries into natural resource management programmes at the village and landscape level".

The study had to cope with some limitations, however the limited time frame compromised, to some extent, the comprehensiveness of geographical coverage and diversity of research tools employed. The field visits were undertaken during the rainy season, i.e. outside the main fishing season. Only a few fishing activities could be observed on the spot and the collection of primary information was based mainly on interviews.

A further limitation was imposed by conducting the research under the umbrella of WCS. Generally, people related the study team to the conservationist approach of WCS and, were somehow hesitant to talk about the actual use and exploitation of natural resources. In particular, it was nearly impossible to get information on hunting practices and the traditional management of wildlife, which is thought to have commonalities with fisheries management. Likewise, informants denied repeatedly that their village is engaged in fishing operations with natural poisons[5] .

1.3 Approach and Methods

The study followed largely a qualitative approach. Complementary to empirical social science instruments such as semi-structured interviews of randomly and/or purposely selected individuals or groups, a variety of participatory tools were used. Meetings and interviews were geared to generate information, but also to

[5]Partly, this answer was correct in the sense that during the rainy season people do not use natural poisoning to catch fish.

assess/enhance the villagers' willingness to actively engage in fishing practices that are environmentally sound and economically and socially beneficial in the long term.

Participatory tools comprised mapping exercises of fishing grounds, spirit places and significant landmarks, drawing exercises of fishing gears, walks to and visit of fishing grounds, and the provisional identification of fish species with the help of a fish flipchart[6], used with key fishers in Kati and Andong Kroloeng administrative villages.

A standard form was used to conduct a census on the main fishing gears and their operation, and selling and buying of fish products. Due to absence (people left for field work) some households[7] could not be censused. The standard form did not include any illegal fishing gear in order to reduce the risks of social desirability response and reactive answers. Information on illegal fishing gears and historical accounts of gear use were gathered through interviews with key informants.

Complementary to this, a survey of fish migrations and fishing operations was conducted, using transects and semistructured interviews with key persons, in villages along the middle and lower reaches of the Chhlong river.

[6] The fish flipchart used in the field was an adjusted version from the MRC fisheries programme in Cambodia. The flipchart comprises 272 photos of different fish species. However, the instrument seems to be biased towards floodplain fisheries, many fish species documented in the flipchart were unknown to the Punong people and some of the fish they commonly catch are not documented in the flipchart.

[7] The term household is used here as an income pooling group, comprising all people living under the same roof and sharing one fire place and the meals. Occasionally, one household can comprise 2 nuclear families and additional members, such as elders, other relatives and/or friends.

2 Ecological and BIOLOGICAL FEATURES

2.1 PHYSICAL SETTING

River habitats are dynamic and subject to local and regional weather patterns as well as land use patterns associated with the river basin. Often, habitats are intermittent and continuously changing, which makes it difficult to delimit them. The river and catchment morphology changes from dry season to wet season, and with it fish populations (Kottelat, n.y. [1998]).

The study area is part of the Chhlong river ecosystem[8]. The source of the Chhlong river is in the uplands of O Rang district (at approx. 460 mASL[9]) between the Punong villages of Pu Poanh and Pu Chu Loe. Its headwaters drain the southern slopes of the Sen Monorom Plateau, also called the Chhlong Plateau (Wharton 1966, cited in Walston et al. 2001), at a distance of around 8 km from the Vietnamese border.

Apart from the Chhlong river, two other important river basins originate in the Sen Monorom Plateau, namely the Te river and smaller tributaries of the Srepok river. The Srepok river basin dominates the northern part of Mondulkiri province.

The conjunction of three tiny creeks, gathering rain water only during the rainy season east of Pu Chu Loe, marks the source of the Chhlong river. On its more than 200 km long way down-stream, the Chhlong waters are nurtured by a series of tributaries[10] of different sizes, with some of the smaller creeks drying out completely during dry season.

Physiographically, the Chhlong river can be divided into the following four sections (Table 24 & Figure 1):

1. **Mekong "*chong toek*"**[11]: Back-up water from Mekong River reaching up to and oscillating around Boeng Kiep according to the seasonal increase and recession of water levels of the Mekong river. During rising floods the water currents nearly come to a standstill, occasionally reversing flow direction. No major deep pools are reported from this section, supposedly because slow water currents at certain times of the year allow for siltation.
2. ***Lower Chhlong basin***: The stretch between Boeng Kiep and the confluence where the O Porr river enters the Chhlong is characterized by a width of up to 150 meters, a relatively deep waterbed and a large number of deep pools. This section continues up the O Porr river to Peam Rang, where the O Rang river enters the O Porr. In this stretch there are the deepest pools of the whole river, some with a depth of more than 12 meters.
3. ***Middle reaches***: This section starts at the O Pórr river mouth. In the O Pórr river itself this section starts around 15 km further up-stream at the mouth of O Rang river, at Peam Rang and extends up to the waterfalls. Between its mouth and Peam Rang the O Pórr river is narrower than the Chhlong river and, more importantly, deeper. Despite the continued presence of deep pools from the mouth of O Pórr the average riverbed of O Chhlong becomes shallower from here up-stream. Thus the shallower water depth acts as a natural barrier for certain fishes on their up-migration.
4. ***Head waters***: The upper stretches of the rivers start with the waterfalls, which constitute another barrier for

[8] Large rivers have received much more attentions than smaller rivers. Most of the biological and ecological studies about river systems in Cambodia deal with the Mekong river and Tonle Sap river and Great Lake and treat their tributaries very cursorily, at best (Poulsen et al. 2002 (a), Poulsen et al. 2002 (b), Van Zalinge 2000, Valbo-Jorgensen & Poulsen 2000, Vannaren & Kin 2000, Coates 2003). Only a few short and general descriptions of Mekong tributaries, other than the Tonle Sap, give a vague glimpse into the functioning and the importance of these smaller river systems (Sam 1999, Jensen 2000, Fisheries Office Rattanakiri 2000).

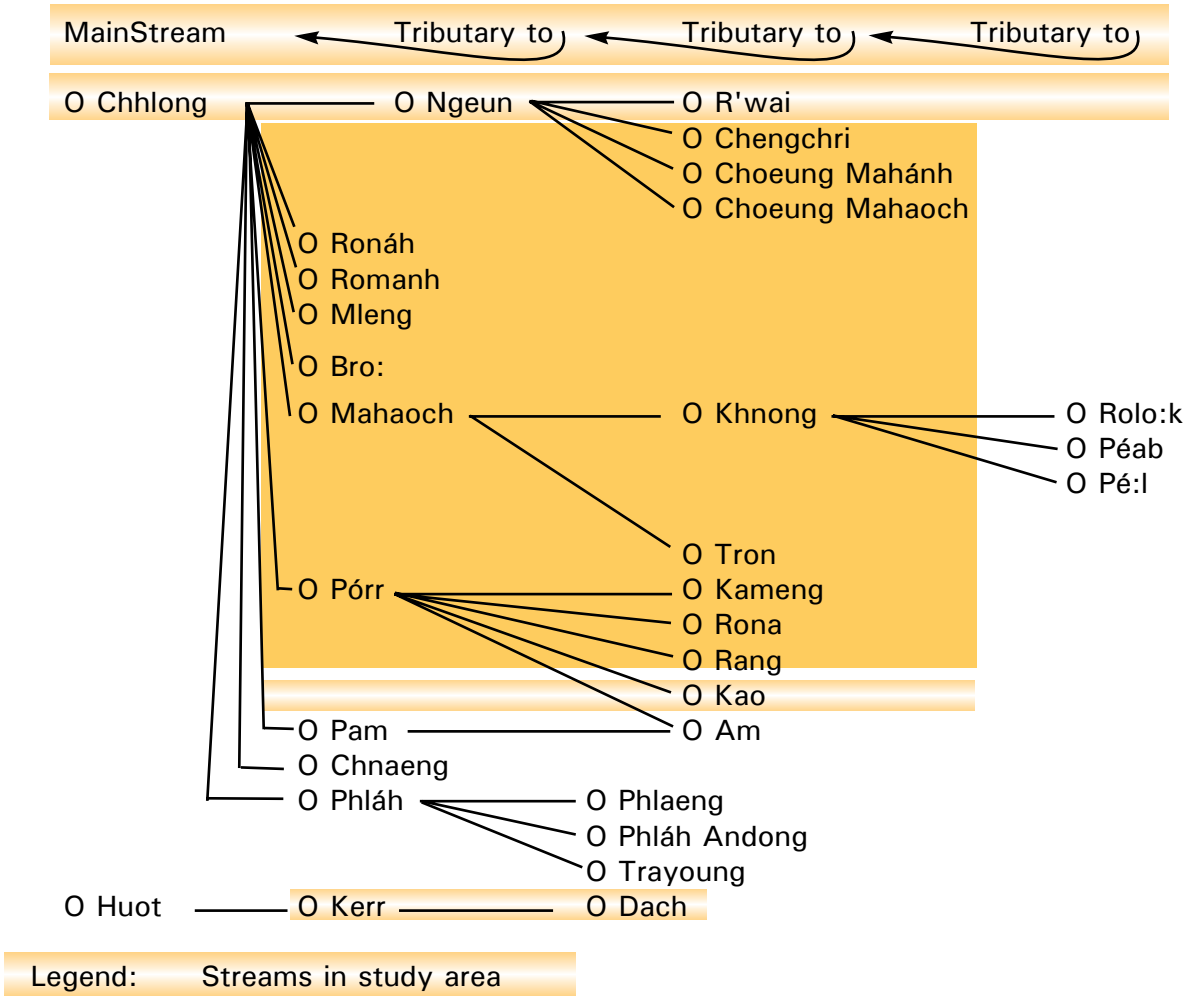
[9] Meters above sea level

[10] [in down-stream order] O Ngeun, O Mahoach, O Pam, O Pórr (also called O Pao by villagers in Snuol district), O Mil, Preik Chreymeang, Preik Pláh, Stoeung Strae Char, Stoeung Krasaing, Stoeung Samleng, Preik Chriv, Preik Choeu Kleoum, Preik Anlung Thom and Preik Choa.

[11] "chong toek" means back-up water.

fish migration of a series of fish species. The headwaters are very shal low in the dry season and frequently form connecting channels between more or less deeper pools and small retention basins.

Table 2: ***Major Streams in the Chhlong river basin and the study area***

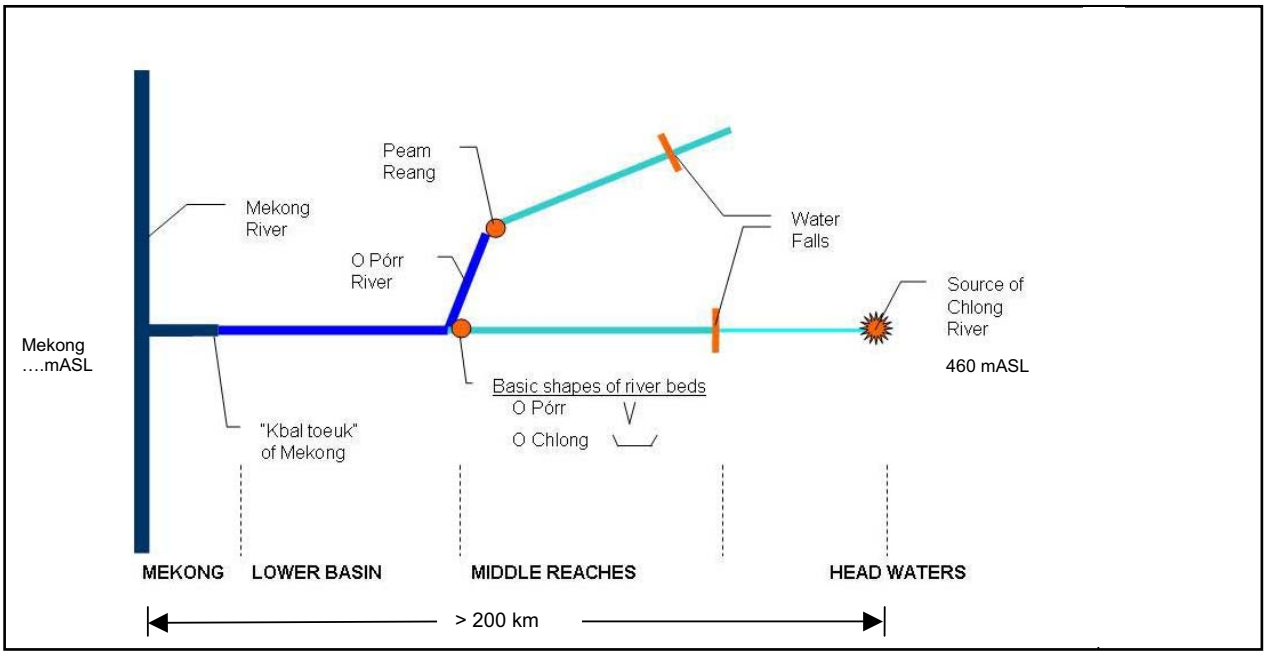


Mostly, the streams in the Chhlong river basin flow through relatively intact forests resulting in a low silt load and clear and transparent water during the dry season. The lower O Pórr river, for example, flows through primary forest and big trees providing a shady and cool atmosphere. However, the forests are under intense pressure and accelerated logging is increasing soil erosion and silt loads, and, thus, turbidity of the river waters.

Rains can vary considerably as can distribution of precipitation regionally, both within and between years. In particular, first and second order streams[12] may rapidly increase their water level with a single rain shower (Figure 2). Small streams in the upper reaches change appearance frequently, between shallow creeks, often with small oxbow pools, and fast flowing streams, according to the actual rainfalls. The roots of the forest vegetation largely prevent surface run-off effects that could result in flash floods and intense sedimentation after tropical rain showers.

[12] Geomorphologists distinguish streams by order: at its source, any stream is of 1st order; when two 1st order streams meet, they form a 2nd order stream; when two 2nd order streams meet, they form a 3rd order stream, etc (Kottelat n.y. [1998])

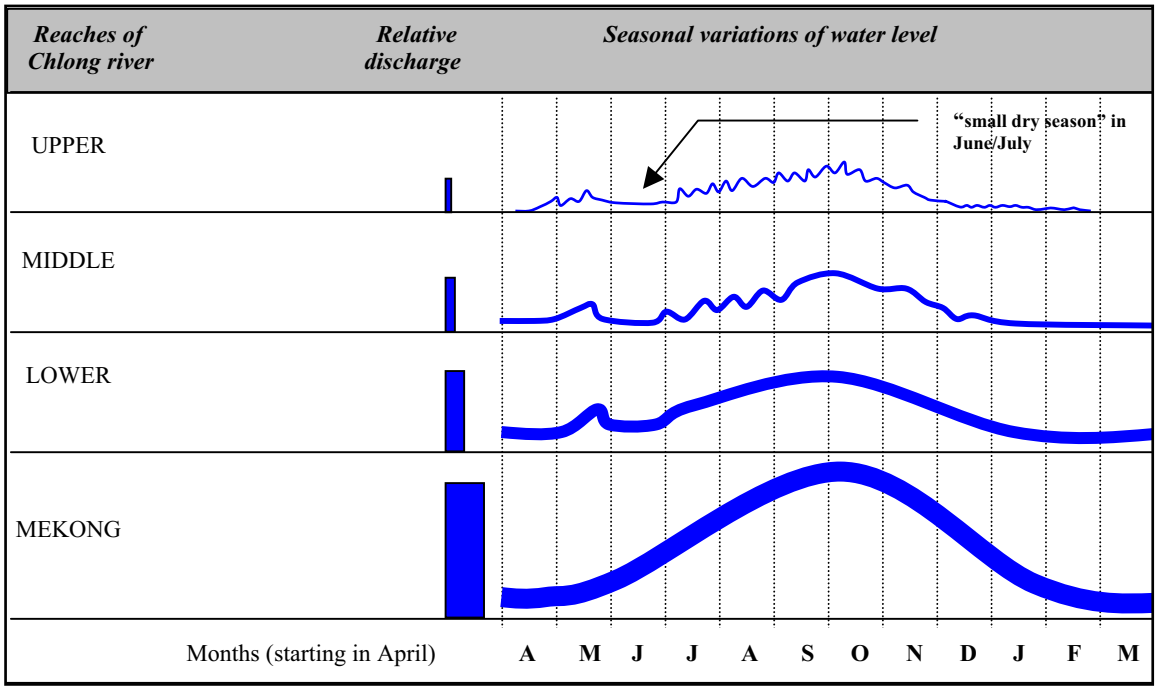
Figure 1: ***Basic physiography of Chhlong river basin***



From August to October most rivers connect to neighboring ponds, swamps and wetlands which then form part of local floodplains; important spawning and nursing grounds for many fish species. Changes in water levels also determine the existence of other river habitats, such as rapids, which appear and disappear as the water level drops or increases.

The target villages of the present study are located partly within the upper part of the middle reaches and the head waters of the O Chhlong river and its tributaries. In this area there are many creeks all of which have names in Punong language, evidencing important landmarks. Likewise, all waterfalls and important deep pools are given specific names, since most of them are also attractive fishing grounds.

Figure 2: ***Scheme of water level variations in different reaches of the Chhlong river basin***



2.2 FISH FAUNA AND BIODIVERSITY

More than 1200 species of fish, possibly as many as 1700[13] , are estimated to occur in the Mekong river basin. In Cambodia alone, far more than 500 species are thought to exist[14]. Around 100 species are used commercially.

The occurrence or absence of fish within the Chhlong river basin depends on the seasonal flooding cycle, physiographic conditions of the riverbed and its alternating water currents, and the ecological requirements of the fish fauna in general. The four distinct sections of the river, described above, also influence the seasonal migratory behavior of the fishes, in particular of the "white fish"[15] species. Each section seems to "trigger" specific behaviors in different species and/or fish size groups. In general, larger fish specimens are only found in the lower and middle reaches of the river basin.

This dependence on a wide range of vital habitats at different times in their lifecycle makes long-distance migratory fish very vulnerable to environmental disturbances and habitat alterations. The status of fish stocks and fish availability encountered in Chhlong river basin may therefore depend on changes and interventions in habitats distant from the study area.
In the study area a large variety of living aquatic resources are utilized, with fish, crustaceans, amphibians and reptiles being the most important. Punong people classify fish into two basic categories: "meat fish" and "scaly fish"[16] . Most of the fish species reported in the case study area belong to the category of "scaly fish".

Some fish names in Punong language specify the locally defined "species family" rather than the species itself. In other instances, Punong (as do Khmer people) have a different name for the same species at different times in its life cycle. Virtually all fish are reported to carry eggs during the rainy season and are presumed to spawn in the study area. With the help of a fish flipchart, people from Pupoanh, Andong Kroloeng and Pu Rung villages, located in the headwaters of Chhlong river, identified more than 90 fish species. Some fishes were named which were not shown in the flipchart. Annex 1 shows the large variety of fish species in the headwaters. Snails, turtles[17], frogs, crabs, small shrimps, snakes and water monitors are also part of the local diet. The capture of frogs does play, at least seasonally, an important role in the provision of animal protein (see Annex 3). Crocodiles have been reported to be seen in some deep pools along the Chhlong river basin (see Annex 7)[18].

2.3 SEASONALITY AND FISH MIGRATIONS

The dry season, from November to April, and rainy season, from early May to October, condition water availability in the rivers and mark the rhythm of fishing seasons and gear use patterns. The seasonal flood-pulse "drives" the fisheries system by increasing the water volume in the rivers and inundating vast areas of floodplains and re-connecting swamps, ponds and lakes to the river channels.
Floodplains are highly productive feeding and nursing habitats for the vast majority of important commercial fishes, while the rivers and streams host critical refuge habitats when waters recede (Welcomme 1979, Dudgeon 2000, Poulsen et al. 2002)[19].

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[13] Coates *et al*. 2003

[14] Rainboth 1996

[15] "White fish" species are scaly fish species and mostly longitudinal migrants.

[16] "Meat fish" is also called "round fish" or "black fish" and comprise snakehead fish, catfish, goby and others. This type of fish is more localized and do not undertake long-distance migrations as do "scaly fish", or "white fish". "Meat fish" has more meat than the "scaly fish".

[17] Fishers in the study area also identified a considerable variety of turtles, i.e. *Batagur baska, Callagur borneoensis, Cuora amboinensis, Cuora trifasciata, Cyclemys dentata complex, Geoemyda spengleri, Heosemys grandis, Hieremys annandalii, Notochelys platynota, Indotestudo elongate, Trachemys scropta elegans, Manouria emys, Amyda cartilaginea.* (Refer to Annex 1. However, some of these species are highly improbable (pers. comm. Tom D. Evans)

[18] The real existence of crocodiles in the study area would require proper field truthing. From the accounts obtained it is not always sure if they are historical, mythological or based on recent observations.

[19] Poulsen *et al*. 2002 refer to the river channels and its associated deep pools as important dry season habitats. However, deep pools in tributaries, such as Chhlong river, serve also as general refuge places during the rainy season when fish migrate into the upper reaches for feeding and spawning.

Fish migrate for spawning, nursing, feeding, growing and shelter. The timing of migrations is conditioned by the water levels and the availability of abundance of feed, mainly from the floodplains (Dudgeon 2000). In this way the Chhlong river and its tributaries are functionally linked to the Mekong River and its associated floodplains, including the Tonle Sap Great Lake floodplains. In general, long-distance migratory fish spawn in upland rivers during the rainy season, their eggs drift down from the headwaters and the juveniles grow on their way to their nursery and feeding grounds in the floodplains. When the water recedes from the floodplains they escape into deeper waters into the rivers. Most fishes are adapted to cope with periods of resource scarcity in the dry season and abundant feed intake during the rainy season (Dudgeon 2000).

Thus, different types of migrations can be identified, such as eggs and larvae drift (as a very particular form of "involuntary migration"), nursing (feeding) migration, "escape" and refuge migration, and spawning migration. During these lifecycle migrations, whitefish species in particular use a broad range of different habitats (Poulsen et al. 2004). The stimuli or "triggers" of these migrations are still little understood, however (Roberts 1993).

Up-migration (May/June - July)

"White fish" and "black fish" have different migratory behaviors. The former are generally known for undertaking long-distance migrations while the latter are more localized and only undertakes lateral migrations between the floodplains to the river channel and/or recession ponds.

In general terms fish migrate upstream twice. In late April/May an initial short period upstream migration starts with the early rainy season. They migrate as far upstream as water levels allow. Commonly, in June/ July a so-called "small dry season" takes place and fish from the upper reaches (headwaters) seek refuge in deep pools in the middle and lower reaches of Chhlong river. During the rainy season, with stronger rains around July, fish migrate up-stream again penetrating into the headwaters of mainstream and tributaries and entering the flood plains connected to the river system[20].

Most breeders come from the Mekong River. The more important taxa among them are trey kéh (*Micronema bleekeri, M. apogon, M. micronema*), trey chhlang (*Mystus nemurus*), trey kahae (*Barbodes spp.*), trey chrakaing (*Puntioplites spp.*), trey chhpén (*Hypsibarbus spp*.) trey Chviet (Pangasius spp.), trey kolreang (*Catlocarpio siamensis*), trey riel (*Henicorhynchus spp*.) and trey slak russey (*Paralaubuca spp*.), among others.

Other fish species, such as trey sanday (*Wallago attu*) and trey pruol (*Cirrhinus microlepis*) migrate from deep pools in the lower Chhlong basin, where they stay during the dry season until they return later in the rainy season to the lower Chhlong again.

Migration up to Peam O Pórr

Trey kéh and trey klanghai (*Belodontichthys dinema*) are reported to migrate up only as far as the mouth of the O Pórr river. Other big fish species migrate only as far up-stream as the mouth of O Reang stream, such as trey sanday, trey khya, trey stuok, and young trey kolreang. These fishes are also very frequent in O Pláh, one of the down-stream tributaries to the Chhlong river. Trey ta'aun (*Ompok sp.cf. eugeneiatus*), trey sambo srolao and trey kaháe (*Barbodes altus*) are found throughout the middle reaches of the river basin.

Waterfalls demarcate drastic changes in elevation contours at the beginning of the headwaters and constitute natural filters for fish migrations. Usually, deep pools at the down-stream side are integral parts of waterfalls. It is here where upmigrating fish congregate temporarily. Many migratory species will only reach the lowest waterfall. Trey kchhoeung (*Macrognathus*

[20] In the Mekong mainstream also two migrations have been reported for 5 economically important fish species, namely *Thynnichthys thynnoid, Pangasius conchophilus*, *Botia modesta, Dangila* spp. and *Pangasius pleurotaenia*, by Heng (2002).

spp.), trey tanel (*Mystus filamentus*), trey andaing (*Clarias* spp.) and some other catfishes and other species cannot "climb" across waterfalls.

However, a number of species are reported to overcome sizable waterfalls (8-10 m, high), often broken up into cascades, and continue migrating into the headwaters. Among these fishes are trey riel, trey krum (*Osteochilus melanopleurus*), trey chpén (*Hypsibarbus spp*.), trey sambó srolao, trey romeas (*Osphronemus exodon*) and most of the other species listed in Table 2 (Annex 1 Fish in the headwaters).

Basin-internal "migrations"
As seen in Figure 2, water levels in the Chhlong river basin become more unstable the higher the riverbed is located within the basin. According to rainfalls and water depth, fish also undertake a sort of oscillating migration between flooded areas and close-by deep pools when waters are low; or they return to the flooded areas with new rains (lateral migrations). Likewise, fish will also migrate between different deep pools along the riverbed (short longitudinal migrations). Local fishers relate these migrations to the needs of fish for feeding, refuge and spawning. Towards the end of the rainy season, when the rains fade out, fish move frequently upstream and downstream between the deep pools in the main riverbed.

Spawning
All fish species found in the headwaters of Chhlong river supposedly also spawn here. Mainly, spawning occurs in its temporarily inundated wetlands and other quiet river areas[21]. Trey riel also spawns in ponds close to the Chhlong river. Trey pra, trey pruol (*Cirrhinus microlepis*) and trey kolreang are among the first to spawn (in May/June). These three fish species spawn in deep pools in the lower reaches of the river. Later in June all other fish spawn.

Down-migration (September - November)
Most fish leaving the Chhlong river basin re-enter the Mekong river during down-migration. However, there are some taxa that stay in deep pools in the lower reaches of the Chhlong river. Among these fish are trey sanday (*Wallago attu*), trey kchhoeung (*Macrognathus* spp.), trey stuok (*Wallago leeri*), trey ksán (*Glossogobius* spp.), trey róh (*Channa* spp.) and trey andaing.

Nearly all fish found in the headwaters spawn there around June. Big fish species seem to stay quite a short period within the river basin as they are the first to migrate down-stream[22]. Trey stuok (*Wallago leeri*), trey khya (*Mystus wyckioides*) and trey sanday (*Wallago attu*) and only the bigger specimens of those species, migrate down already in August. Also trey kéh and trey klanghai (*Belodontichthys dinema*) leave the Chhlong river in September. Smaller specimens of these fishes commonly stay longer time in the river basin and will down-migrate with other fish species, starting later in September. In October / November, kae kdek, when the first fresh winds appear and temperatures become cooler, down-migrations involve all other longitudinal migrants.

[21] Fishers interviewed reported that during spawning migration all fish emit mating sounds. In May/June while diving they say that they can hear the fish "crying". Each fish species has its distinct sound. Trey chhlang (Mystus nemerus) is the only fish whose sound can be distinguished clearly because when caught it still keeps on "crying" on land. Other fish don't continue their mating sound once they are caught. Fishermen also claim to be able to hear the sound of the fish when they enter the floodplains once connected to the main river channels.

[22] As evidenced in the catches of the dai fisheries in the Tonle Sap river in October and November, here also big fish specimens migrate first out of the Tonle Sap floodplains (Van Zalinge et al. 2000).

3 PEOPLE

3.1 History[23]

The Punong and other indigenous people, like Stieng and R'ong, have been dwelling in the study area and adjacent forests since time immemorial. Until recently they were separated from mainstream Khmer society.

During the times of the French Protectorate colonial officers made the first attempts to integrate Punong people into the (colonial) society. Men were taken into the armed forces and both male and female villagers were engaged in compulsory work in road construction and rubber plantations, with men being rewarded with official ID cards. Under Sankum Reastr Niyum[24], Government Punong soldiers of the colonial armed forces were integrated into the national armed forces. Attempts were made to relocate dispersed settlements into more compact villages along the main road to Mondulkiri [25].

During the 1970s all villages in the study area were exposed, successively, to Viet Cong fighters, Lon Nol soldiers and American armed forces and CIA operatives.

Viet Cong soldiers incurred into Mondulkiri highlands in 1967/1968. They maintained a relationship of reciprocity with indigenous villages in the area, exchanging meat from wild animals killed in the forests for rice from Punong people. The soldiers also bought chickens and pigs from them. Also Viet Cong soldiers provided basic healthcare to local people. The soldiers heavily impacted on local wildlife stocks, including fish, using guns and grenades. Wild elephants and other large mammals were seriously decimated.

The bombing, by American warplanes, of the Hoh Chi Minh trail resulted in the gradual retreat of Viet Cong fighters in the early 1970s. Numerous bomb craters around the villages and in the forests still give testimony of these war activities, including two wrecks of crashed American warplanes. Andong Kroloeng was most heavily affected by the bombing, including with napalm. The whole village was burnt down, rice fields obliterated and all livestock was killed. Before the air raid, villagers were warned by Viet Cong soldiers about the up-coming American attack and just managed to escape. From 1970 onwards, Lon Nol soldiers raided villages and introduced a militia system by which every village was to be controlled by four to five militias.

As Lon Nol's soldiers were not able to contain the Viet Cong, American ground troops also entered the area. Military camps of American soldiers and CIA agents in Kati and Andong Kroloeng were installed for three months and 2 weeks, respectively[26]. American soldiers provided health care to local people, including tablets to treat malaria and air lifts in case of serious wounding. They also distributed sweets, chewing gum, cookies, cigarettes, fruits, etc. as gifts. Punong people were instructed to wear their traditional clothing and appear in the open village areas as soon as they heard a warplane from distance and greet the up-coming bombers.

Villagers did not get actively involved in fighting nor were attempts of recruitment undertaken from either side. In Kati, villagers from (nowadays) Sre Ampil were employed as camp staff for minor maintenance jobs.

[23] Only a short summary of the recent history since independence is given here. Guérin (2003) provides a detailed account of Punong history from 1859 to 1940.

[24] Also referred to as "Sihanouk times", starting after national independence until 1970.

[25] In fact, all target villages of this study are located along the old French road to Mondulkiri. Only Pu Rung, as part of Pu Clair sector is distant from the road and more difficult to reach.

[26] These former camps are used today as scrap metal mines by villagers.

In 1973 Khmer Rouge (KR) cadres appeared in the area and started to control village life. Communal field work, communal food intake and prohibition of sacrificing to their spirits, among other rules, became the order of the day. As a consequence, many Punong people from the area escaped to neighboring Vietnam; only a part of them returned afterwards. In 1975 the KR removed all inhabitants of the villages in the study area from their settlements and resettled them in Koh Nhek[27] district, Northern Mondulkiri. There they were instructed in paddy rice farming and forced to dig canals and build irrigation dikes.

In 1979, when Vietnamese armed forces moved in, they considered the people originating from Keo Seima and the O Reang area to be allies. The original inhabitants of Koh Nhek, however, were regarded as KR sympathizers. Many of the former were taken up into the military forces combating KR pockets still active in the area until the mid '90s.

The return from Koh Nhek to their homeland villages took more than a decade and many villagers did not return to their original villages[28] before the early 1990s. Some never returned to their original villages. Most of them left Koh Nhek between 1980 and 1982 when they moved to the gold mining area around Memong. In 1988 people started to move gradually back to the provincial town or to the district towns in O Reang and Keo Seima. District governments engaged many new arrivals in their militia forces in order to provide for security and claim control over KR areas.

Many old villages were not rebuilt in their original location, both, because of the continued presence of KR cadres and the prevailing Government policies to resettle new villages in response to KR presence. Villages like O Char and Sre Ampil are two of these new creations starting up as temporary militia posts of the district.
In the late 1980s and early 1990s whole families started to return to their former villages and to militia posts where they had relatives. By 1992, at the arrival of UNTAC most of the villages seemed to be more or less "established", considering the mobility inherent in the common practice of shifting cultivation.

In 1998 the remaining KR troops were officially reintegrated into the Royal Armed Forces of Cambodia and into civil society. Eighty soldiers, including two commanders[29] were taken over into the provincial armed forces and land for settlement was provided to around 200 former KR soldiers and their families. The settlements were located between O Am and Chnaeng in midst of Snuol Wildlife Sanctuary, which had serious consequences, environmentally and socially.

3.2 Demography

The Punong are indigenous people. Together with other indigenous groups they represent around 70% of the population in the province. In general, they are referred to as hill tribes or "chunchiet", meaning "ethnic people" or "nationals" by their Khmer co-nationals.

Punong people themselves distinguish at least three major groups of Punong, identified through their different dialects and geographical distribution: (1) Northern Punong (Sen Monorom town to northeast Mondulkiri), (2) Western Punong (Lower Chhlong river and North of Kratie and (3) Southern Punong (upper Chhlong river, also called [by "Western Punong"] "Punong Stieng"). The study area is inhabited by the latter group.

In contrast to the official boundaries of the three villages (of the study area)[30] delineated by the provincial public adminis-

[27] The period is often referred to as "the three years regime" or "the middle regime."

[28] or group of co-villagers and family members who had settled in a different place in the meantime.

[29] One of the commanders was ethnic Lao, he died in 2002. He brought in 4 ethnic Lao soldiers who have settled in O Am since 1999.

[30] The administrative village Andong Kroloeng comprises Pu Poanh, Pu Chu Loe, Pu Chu Kraom, Pu Clair, Andong Kroloeng and Pu Rung settlements. The administrative village Kati comprises the settlements Kati, Kati Thmei (or also called Daem Beng) and O Tron. Two of the surveyed sectors (10 and 11) of O Am are located in Labaké; the others (4 and 16) are located along the main road.

tration, two of them, namely Kati and Andong Kroloeng, are in fact composed of, respectively, three and six socially recognized Punong settlements. In general, public administration refers to the different settlements as "krom" or sector, sometimes also including two small settlements into one "krom".

The administrative village of O Am differs strongly from Kati and Andong Kroloeng. O Am, a major market place and point of in-migration, is divided into 18 "kroms" with mostly Khmer families (>82%), some Stieng (6%) and Punong (8%) in addition to four and five ethnic minority Vietnamese and Lao families.

Kati and Andong Kroloeng are largely made up of ethnic Punong people. However, a few Khmer families have settled in these villages, often pursuing business opportunities and/or intermarrying with Punong.

3.3 Natural Resource Use and Livelihoods

3.3.1 Forest and land use

Punong traditional culture reflects their dependence on the forest. Their livelihood and coping strategies are based on a deep ecological knowledge that allows them to take advantage of native trees and plants, animals, fish, rivers and land. They hunt, raise buffaloes, cows, pigs, chicken and dogs, fish in rivers and ponds and collect a variety of other forest products for food, construction materials, fishing (fishing gear and fish poisons) and for medicinal purposes. The forest provides substantially for food security, with a vast variety of products available during the yearly cycle. At times when one crop is scarce, a substitute can often be found, for example, natural tubers may substitute when the rice stores are low.

The practice of natural resources use in Punong society is governed by the principle of sharing and avoidance of waste. It is regarded as a sacrilege to kill an animal or fish and not eat it entirely. Likewise, apart from being a waste of physical energy, it would be a sacrilege to clear forest land and not use it afterwards.

Farming

Punong people in the study area farm upland rice in combination with a variety of chamkar[31] crops, such as maize, pumpkin, cucumber, beans, bananas, etc. In Pu Rung and O Am there are also paddy rice fields. For more details in Annex 2 a table of seasonality of sources of farmed foods and produce collected from the wild is provided.

Resin collection

One of the most important livelihood strategies is resin collection. Since the end of 1980s resin tapping became the most important source of cash income (Evans 2003).

Most of forests in the Chhlong river basin used to belong to Samling Logging Concession from the Mekong River up to the Sen Monorom Plateau along the Vietnamese border. Logging operations in 1998 and 1999 extracted resin trees from many forest areas and, as a consequence, the income opportunities from resin tapping of indigenous Punong people[32] decreased.

Despite the moratorium of logging operations since 1999, unregulated, anarchic logging is continuing in a sort of "decentralized manner" in the whole river basin. In the lower reaches of the Chhlong river basin whole villages seem to be involved in illegal logging operations, driven by local government and armed forces[33].

The people affected most by the loss of resin trees, mainly Punong indigenous peo-

[31] Chamkar fields are garden fields intercropping up-land rice, a variety of vegetables, corn, fruit trees, etc.

[32] Walston et al. 2001 ; Evans et al. 2003

[33] In Srae Triek and Veal Konsaing, at the lower Chhlong river basin in Kratie, large parts of the village labor force was engaged in logging operations, as observed in October 2004. Commune chiefs, police and military personnel were reported to facilitate the operations on behalf of timber traders and sawmill operators in the district town.

ple, have started to cultivate cashew or other cash crops on their fallow farmland, instead of leaving it to recover as they used to do traditionally. Cashew growing is also popular among families not affected by resin-tree logging.

Hunting[34]

Hunting has always been an integral part of Punong livelihoods. Though it is legally forbidden, it is practiced in all villages. Locally, hunting is called "going out with the dogs" indicating the main hunting method. Generally, dogs may track down smaller animals such as turtles, snakes, water lizards and monitor lizards, which then can be collected by the hunter. Big game hunting seems to be a rare event.

3.3.2 Fisheries

Fisheries and livelihoods

The importance of fishing and the collection of other aquatic animals is indicated by the time people dedicate to this activity, which is, reportedly, much more than the time spent hunting for terrestrial animals. Another indication is that the consumption of domestic animals is largely restricted to special occasions and sacrifices.

According to people interviewed the abundance of fish has decreased, especially with respect to larger species. Quantified information, i.e. on catch per unit effort (CPUE) could not be compiled in the course of the study and would require specific investigation.

Traditionally, fish was never sold, but shared. Today, fish products are becoming increasingly a commodity of trade. In O Am, with major market facilities, nine households (10% of censused households) from four sectors surveyed reported to sell fish (Figure 3). Throughout the year the average monthly amount of fish they sold was around 30 kg per household. This amount seems to be relatively high and it might be explained by the use of illegal fishing gears, in particular electrocuting. At O Am market also other fish products such as dried marine fish from Viet Nam, live snakeheads and walking catfish (Clarias spp.), both from cage culture in the Mekong river, and a variety of fish paste products and (Khmer) prahoc from Kamong Cham and Kratie provinces are sold. In Kati 9% of censused households sell fish and in Andong Kroloeng 6%. Small surpluses of catches are sold inside the village. These transactions occur parallel to still prevailing sharing mechanisms referred to earlier. From Kati, markets are more difficult to reach than from Andong Kroloeng, which might explain their low amount of fish sold.

The pattern of buying fish is similar to selling (Figure 4 to Figure 6). Decrease in fish availability correlates negatively to market access. In O Am, households buy considerably more fish than in the other two villages, including larger amounts of fresh fish as well as a significant amount of dried and fermented fish. In Kati fish paste (prahoc) is nearly the only single fish product to spend money on. All other fish products are made locally, in particular Punong fish paste, called "kaó:m".

Several mobile fish sellers enter Andong Kroloeng administrative village selling dif-

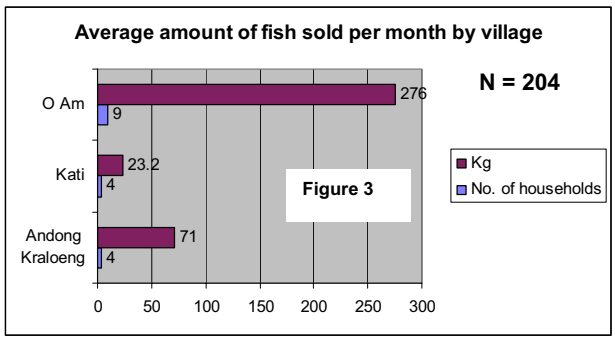

Figure 3

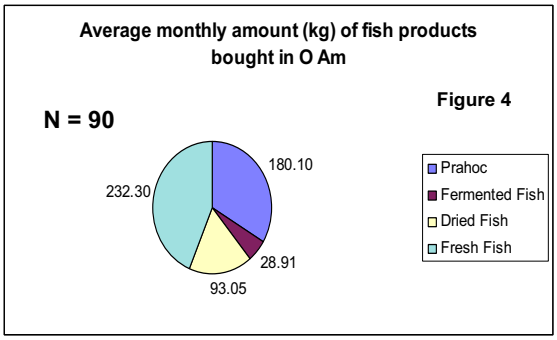

Figure 4

[34] In general, it was difficult to obtain information on hunting activities, given that the informants perceived that any answer could be highly compromising. Thus, it was not possible to establish commonalities or differences of management systems of wildlife and fish.

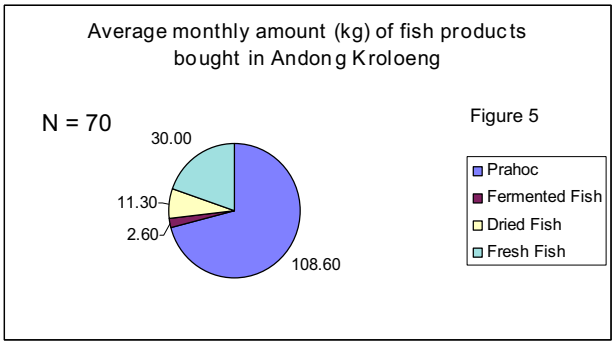

Figure 5

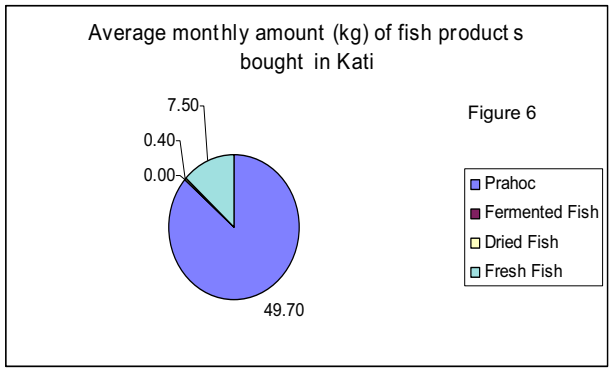

Figure 6

ferent fish products in all Punong villages except one, Pu Rung, which is too difficult to access by car or motorcycle.
In the Punong village Kati there are two local shops that sell prahoc. Fresh fish is bought occasionally from Keo Seima market when other market transactions are undertaken.

Fishing operations

In comparison with the overall lower Mekong basin, the ecosystem of the headwaters[35] of the Chhlong river basin is less diverse. Punong people here have, traditionally, used a rather limited number of fishing gears, compared to the enormous variety of fishing gears and methods encountered in the floodplain. The spectrum of traditional gear types comprises fishing by hand, scooping baskets (chneang), covering and lifting gears, hook lines, gillnets, basket traps, small barrage systems, pumping out of small water bodies, (Annex 3). Gillnets and hooks are the most frequent fishing gears. By far, the most important fishing method in Punong villages has been, traditionally, fishing with natural poisons. This method has been critical for providing villagers with a large amount of fish in a short time, allowing them to make fish paste, locally called "kaóm". Fishing with natural poisons is part of the cultural heritage of the Punong. Commonly, the use of this method is locally regulated and requires the consent of the spirits and a well organized larger group of people to cope with the multiple tasks. Environmentally, natural poisons seem to have a short-term effect, since they naturally degrade and lose their effectiveness within 24 hours. Snakeheads, catfishes and other anaerobic fish species, crustaceans and amphibians remain largely unaffected by the natural substances, as do human beings (see Annex 4).

In Fig. 7 to Fig. 9 the number of the main gears used today is shown. One gillnet is between 10 and 15 m long and one fisher may use up to four or five net pieces. Longlines are counted by the amount of hooks. Presumably, the fast flowing river ecology which prevails in headwaters around Andong Kroloeng makes longlines technically non-feasible, as they are used preferably, and more successfully operated along the edge of rising waterlevels in

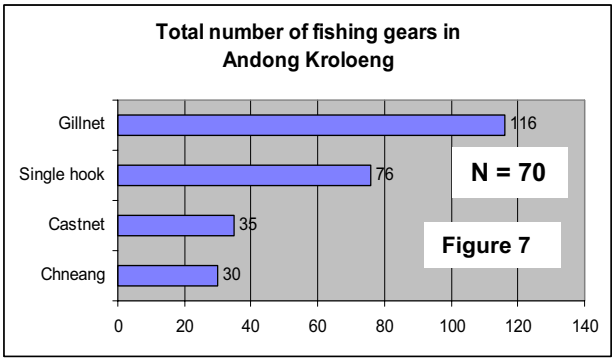

Figure 7

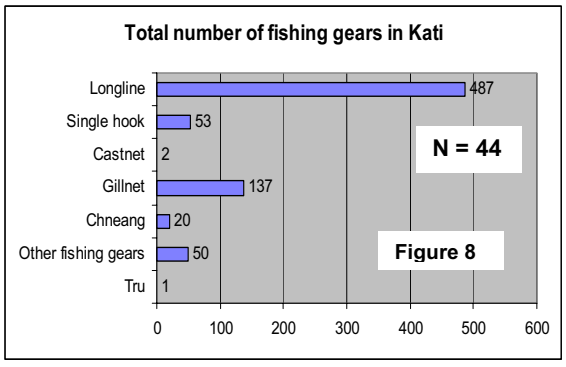

Figure 8

[35] Villagers in the headwaters such as Pu Poanh, Pu Chu, Pu Clair, Andong Kroloeng and Kati, located along the old highway on top of a mountain crest only access river fishing grounds and (distant) rice fields. In Pu Rung, Kati Thmei, Pu Tron and, especially, in O Am villagers have also access to seasonal lakes and swamps. Most of the lakes are located in the plains area between the new road to the province and the Vietnamese border in the surroundings of O Am village.

plains and swamp areas.
Other fishing gears also include electric gear and small mosquito netting bagnets, called "du" (both illegal gears).

At the source of the Chhlong river the gear variety is smaller than in O Am, due to the latter village being located closer to the middle reaches of the basin and experiencing larger immigrations from outsiders, who introduced different gears, such as bamboo tube eel trap (loan) and basket traps with lateral entry cones (tru).

Most of the fishing activities are undertaken individually and without any gender specifics except for two cases: scooping baskets are only used by women and children, and castnets are largely used by men. However, in line with other gender-specific preferences regarding division of labor in housekeeping, farming, hunting, resin collection and collection of other forest products, men participate more intensively in fishing activities than women.
Apart from individual fishing activities, fishing in small and large groups, e.g. entire villages is quite common. Even inter-village cooperation in larger fishing

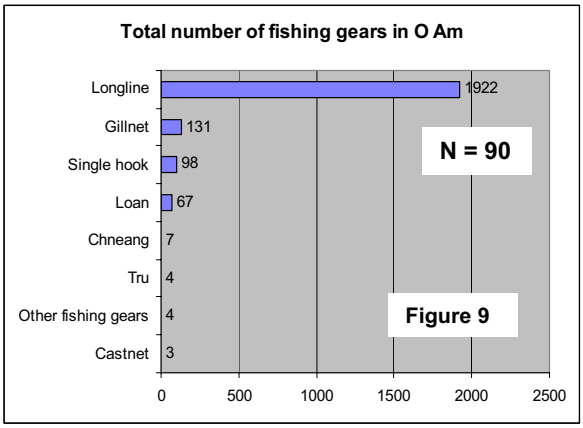

Figure 9

operations has been reported in the study area and along the lower reaches of the Chhlong river basin. Family members, friends, or neighbors may work together pumping out shallow pools, fishing with castnets or using plunge baskets in recession ponds. Collective fishing operations in deep pools are conducted with natural poisons during dry season.

In the past, Sre Ampil and Pu Char cooperated in undertaking joint fishing operations in large deep pools far from the villages, yielding several oxcarts full of fish. Fishing with natural poisons provides the whole community with relatively large amounts of fish, which is usually processed into fish paste (called in Punong language "kaó:m"). Though processed in a slightly different way than Khmer "prahoc", it constitutes an important ingredient of most meals.

Cosmovision

Traditional societies of indigenous peoples deriving their livelihoods almost exclusively from the natural resources of their ancestral lands commonly have in-depth traditional knowledge of the ecology and biology of the habitats they live in. Their practice of livelihood and management of natural resources are embedded in social institutions, all of which reflect traditional beliefs and their world view (Berkes 1999). Thus, understanding their cosmovision is of paramount importance for understanding their traditional resource use patterns and management system. This understanding, in turn, is crucial as a baseline for analyzing external influences and processes of acculturation.
Punong animist religious beliefs and practices are shaped by the need to provide access to, share and make the best use of vital resources. Within Punong worldview, humans are part of the "community of beings". Social values such as reciprocity and respect for each other also apply for human-animal relationships. These relationships are controlled by the spirits which inhabit mountains, special forest places and/or trees, salt licks, waterfalls, or deep pools in the rivers or lakes.
The Punong beliefs represent a metaphysical superstructure in which the spirits control the success of a hunt or a fishing trip, and also access to land. In order to access

Commonly, malignant spirits are associated with white crocodiles or white snakes or white turtles. Therefore, it is compulsory to communicate whit them by meams of sacrifices whenaver these places are visited. The purpose of the visit defines the type of sacrifice. When somebody just passes by s/he may only offer a cigarette, or some tobaco, or some rice or at least a gesture of praying

natural resources, Punong people call on the "neak ta"[36] that is believed to control them and ask for permission to use them. This may imply making a sacrifice in form of chicken blood and rice wine. Each Punong village has its own particular spirit or set of spirits which is believed to govern the use of natural resources. It appears that the village selects its neak ta and cultivates a relationship with it.

Places which spirits are believed to inhabit are associated with vital and potentially high yielding natural resources. Often they can be dangerous and life threatening. In order to protect individuals and the community, rules of conduct (including taboos) are invoked periodically or at specific events. Sacrifices are made to the "village neak ta" at the village spirit house once a year. To other local spirits, sacrifices are offered preceding important events in a specific place (farming and fishing), or following a period of time after which a specific amount of resources has been gathered (hunting).

Collective spirit ceremonies create transparency and cohesion within the community; ceremonies are not a matter of secret worship by an individual but are celebrated as public events. The obligation to hold a spirit ceremony in places that potentially yield abundant harvests eventually implies sharing of the harvest. It is considered not possible for an individual to conduct a major fishing operation with natural poisons, for example, unless he is willing to risk that the spirits punish him and/or the community. Thus, spirits facilitate cultural, social and physical reproduction of the community as an institution (see next chapter).

In addition to the "neak tas" there are other spirits are believed not to be the guardians of a particular village (such as the Keo Seima[37] spirit before Sre Ampil selected him as their neak ta). Other spirits associated with deep pools in the river or big trees, called "preay", are considered not to be benevolent, so requiring people to hold ceremonies for them to avoid problems (for example before fishing a deep pool in the river).

There are a variety of other kinds of spirits, which were not studied in detail. They include "arak" spirits, which appear to be associated with particular families, and there are a number of people in each village who are mediums for "araks". White wild animals are associated with spirits: white fish, white snakes, white crocodiles, white turtles, etc. These white animals are believed to have "praloeung", which might be translated as soul. (Wine jars and rice also have "praloeung")

The most important taboos related, but not limited to poison fishing in deep pools are:

- A fisher can not say to somebody else "I go fising now"; if he did, he wouldn't catch any fish.
- If one fishes in a river, sees a lot of fish, and says: "Uhhhh,...there are a lot of fish", then all the fish would disappear. At home one can say "there was plenty of fish", but not in the forest.
- In the forest people have to be quiet. If they talk to each other they should not talk about fishing or hunting, about big fish catches or a good kill. People have to be modest.
- If one makes a plentiful catch and would then say: "Now I will cook or fry all this fish", then he or she would get sick and stomach ache would strike him or her.
- Everyone other than pregnant women can fish in the deep pools if they follow the rules. Pregnant dogs are not allowed to go.
- During fish poisoning, if somebody does not behave, the fish would not succumb to the poison. The "preay" would not allow the fish to get poisoned.
- When a girl or woman is menstruating, she cannot go and take a bath in the river or undertake any fishing activity.
- When a woman has just delivered a baby, she also cannot take a bath in the river during the first month after giving birth.
- If a woman delivers in the forest by accident, (if for example she felldown causing a premature delivery) this is considered a serious case (of offense to the spirits).
- A boy and a girl cannot have sexual intercourse close to a spirit pool; if they do, somebody at the village gets sick or may die. You also may see dead leaves floating on the water surface.

[36] "neak ta" is commonly conceived as a benevolent guardian spirit.

[37] Keo Seima is the name of a mountain forest spirit, which is believed to be very powerful. Proof of his power is the fact that during the American war the area was entirely saved from bombing.

4 Traditional Natural Resources AND FISHERIES MANAGEMENT

4.1 Traditional Management Institutions

As pointed out in chapter 1 the study was aimed at three administrative villages with two of them comprising in total nine Punong villages (Andong Kroloeng comprises six [6] and Kati three [3] Punong villages).

A Punong village is defined by a set of village specific attributes including "village neak ta", boundaries and a burial ground. Villagers have a clear understanding of their village boundaries.

Traditional Punong authorities, with their main function as stewards of local cultural values, are still more influential than formal authorities nominated by commune or district authorities. The most important local authorities are "me Kontreanh"[38] , "chas srok"[39], and the elders (White p.337).

In the study area the chas srok is the highest moral authority. In Punong villages at the lower Chhlong the me kontreanh had a higher ranking than the chas srok assuming a role similar to that the commune chief does nowadays. Both of them constitute the highest moral and religious authority in their villages. The me kontreanh used to have a coordinating authority among several villages and, historically, also had the capacity to recruit a small contingent of armed forces if necessary. Another major function of the me kontreanh was to organize communal fishing operations that required massive participation of many people from several villages (see chapter on organization of fishing).

Generally, all villagers participate in selecting their chas srok or me kontreanh. He is selected on criteria of his status as an elder, honesty, modesty and his personal integrity, in addition to his skills to tell stories. He has to have strong leadership qualities and good communication skills, making the village elders participants in important decisions. The chas srok or the me kontreanh, as well as certain elders usually have important roles during spirit ceremonies, wedding ceremonies and funerals. They are in charge of mitigating conflicts according to customary law. In complex resolution cases the chas srok or me kontreanh will consult with the village plenary. In case he took biased decisions of conflict resolution and outside local traditions, the village plenary had the option to remove him from his position as *primus inter pares*.

Every village clearly identifies its elders, both women and men, representing the different family lines. They are very important in transmitting Punong non-written culture, from one generation to the next and, thus, vested with a high degree of authority. Frequently, they participate next to the chas srok in conflict resolution and give advice to young people and newly married couples. The village elders, chas sroks, etc. function within the context of the modern administrative system of village and commune chiefs.

They are the only authentic sources of the non-written customary laws. In accordance to their paramount importance for the survival and reproduction of Punong culture they are highly respected by the whole village. Conflicts between generations do not seem to be very accentuated currently, even though younger generations have different interests from the elders. Customary laws not only include but

[38] Probably, the "Me Kontreanh" has in the study area the same function as "Chas srok". By contrast, in the lower Chhlong basin he had a coordinating function between several villages.

[39] "Chas srok" is a village elder and highest authority in terms of moral authority and social ranking.

are based on obligations to the ancestors or the power of the spirits. Taboos and rules of respect to the spirits act as deterrents and are enforced by the elders. Infringements of those regulations do have serious impacts not only for the individual but for the community as a whole and, thus, need to be carefully watched over. Infractions would bring about the anger of the spirits, resulting in failure of hunting trips or fishing operations or sickness and even death of somebody in the village. Compensatory costs of infringements are commonly very high and paid in form of sacrificing pigs, chicken and alcohol to the offended spirit.

Since the days of the French Protectorate, only people from within the village had free access to the resources of the area defined as village lands, to farm, fish or collect forest products. The use of resources from a neighboring village required the consent of their chas srok.

Among Punong villages in Snuol district the term "boundary", traditionally, referred to specific types of resource use, which were important sources of livelihood ("rok sí:"[40]). Since each village had its own set of spirits, if somebody wanted to access "rok sí:" he had to ask the me kontreanh or chás srok at his village for permission. He then had to inform the me kontreanh at the commune. In that way it was guaranteed that the spirits of the villages concerned were properly "informed".

The following access regulations to natural resources were recorded from Snuol district, but they seem to be valid, at least partly, in other Punong villages of the head waters[41] .
Activities that could be carried out only within village boundaries were:

- clearing farm land,
- burying the dead,
- clearing paddy land and chamkar
- making ceremonies for the spirits

Activities that could be undertaken anywhere but needed the permission of the relevant chás srok or me kontreanh were:

- cutting wood for houses,
- cutting wood suitable for carving boats,
- collecting dry resin
- cutting rattan

Activities that were allowed anywhere comprised

- "walking dogs" (meaning "going hunting") and
- fishing with small fishing gear

[prokán[42]: communal fishing grounds could only be fished within the context of collective or inter-community fishing operations] - in any pool even the spirit ones[43]. Before, people were allowed only to fish in their area. Nowadays, exclusivity of fishing rights within village boundaries is not conceived as strictly. People from other villages can undertake larger group fishing operations beyond their village borders. People feel compassion for each other, since everyone is conceived to be a relative, so people need to help each other. In practice, there is a lot of "forgiveness" back and forth[44] .

4.2 Fisheries Management

According to FAO (1997), fisheries management is defined as an "integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and accomplishment of other fisheries objectives".

[40] "rok sí:" translates literally into "business".

[41] The extent of the validity in the study area could not be fully explored within the context of this study, due to the aforementioned approach and resulting limitations.

[42] Prokán: is a restriction based on something; it makes a distinction between different things. It means a person cannot go over there, and from there persons cannot come here. In the old days there was no "prokán" [which is in fact a very negative word], only with regard to farming land.

[43] Please note that, commonly, in spirit places only bigger gear and communal fishing operations work effectively. For smaller gear other fishing grounds are more productive.

[44] Agreements are made between the village chiefs and villagers from both villages. Villagers from Sre Ampil can borrow buffaloes from people of Chnaeng; villagers from Pu Rung borrow from Pu Char, etc. If they need a pig they can borrow a pig from the other village. So if one village is too strict on the fishing grounds they would have difficulties to borrow buffaloes or pigs from the neighbors.

Cambodia, as a member of the United Nations, is signatory to the Code of Conduct for Responsible Fisheries developed by FAO. Though it is not binding for governments, it provides very useful guidelines for improved fisheries management (FAO 2003, FAO 1997). Regarding management measures it is proposed that "when deciding on the use, conservation and management of fisheries resources, due recognition should be given, as appropriate, in accordance with national laws and regulations, to the traditional practices, needs and interests of indigenous people and local fishing communities which are highly dependent on fishery resources for their livelihood" (FAO 2003: p.29)[45] .

4.3 Traditional Fisheries Management Rules

Access and rights regimes are central elements of fisheries management. As implied above, fisheries management measures are embedded in the cultural (cosmovision, knowledge system, traditions, religious beliefs, etc.) background of Punong people.

Traditional fisheries management includes both intentional and inadvertent measures. Practices and taboos related to appeasing the spirits and preventing the community from suffering punishments of the spirits can be seen as management measures as they directly regulate access to the resources and influence their sustainability (COFAD 2002). Some of the most visible management measures for fisheries are:

Access control

In principle, access to fish is granted to everybody following the regulations including the rules of respect to the spirits. Decisions regarding allocation of tenure or conflict resolution are made by traditional authorities, and enforcement is carried out by the users of the resource. Fishers from other villages, neighboring as well as from further afield, need to inform the traditional authority if they want to conduct a major fishing operation, for example in a deep pool. Access to fishing grounds is granted as set of rules of conduct with regard to different types of fishing grounds. Individual fishing is allowed everywhere, except in communal fishing grounds for natural poisoning (see Annex 4). This measure translates into geographically limiting the resource pressure.

Closed areas

There are also some places that are completely off-limits for any fishing activity. The spirits inhabiting these places are considered "very strict" and any lack of respect would result in serious consequences, such as sickness to everybody in the village. Frequently, closed areas are deep pools, often associated with waterfalls. Here fish may concentrate as the waterfall forces some species to discontinue their up-stream migration. Also a series of taboos and rules of conduct, that describe forms of expressing modesty and respect to nature while retrieving benefits from it, have been widespread. Closed areas, thus, reduce fishing effort and facilitate stock recovery and recruitment[46].

Gear restrictions and restrictions of particular fishing methods. The main gear restriction refers to use of natural poisons, in particular the application rate of natural substances during the fishing operation. Introduced and highly damaging fishing methods, such as electrocuting, chemical poisoning, explosives and the use of small mosquito netting bagnets are rejected and negatively sanctioned by the traditional authorities. Banning highly damaging practices significantly decreases fish mortality and, consequently, aids resource preservation. However, compliance with these restrictions is a function of governance (see chapter 5.1).

[45] One of the most important principles propagated by the Code of Conduct for Responsible Fisheries is the precautionary approach, which refers to "a set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resources, the environment, and the people, to the extent possible taking explicitly into account existing uncertainties and the potential consequences of being wrong" (FAO 1997).
The Technical Guidelines propose that "States should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to prevent them and preserve the aquatic environment. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures" (FAO 2003:26/27).

[46] Number, location, nature and species composition typically found in closed areas would require further research to fully assess their importance in fisheries management.

Sharing of individual fish catch
The principle of sharing of forest products when they are abundant effectively translates into economizing use of natural resources and fish. The custom of sharing fish also creates a sort of public mechanism to monitor extraction of fish. In particular, widows and sick persons who have limited access to fish have to be given fish by the more productive members of the community. This measure also reduces fishing effort, since people are not allowed to privatize a big catch entirely.

Sacrifices (or payments of fees)
Specific places, as mentioned above, such as deep pools can only be accessed for poison fishing following a sacrifice to the spirit. Sacrifices are integral to fishing activity. Even though sacrifices intend to provide for a bountiful fish catch, they fulfill the function of decreasing fishing intensity by individuals because costs are incurred by "investing" in a spirit ceremony. Also, the belief in the necessity of sacrifices leads to public control/visibility and reduction of excessive resource use.

4.4 Formal legal framework

Fisheries Law
All fishing activities undertaken within the inland fisheries domain[47] are subject to the fisheries law of the Kingdom of Cambodia. The Department of Fisheries (DoF) is responsible for the development of fisheries policies, their application and enforcement.

The fisheries law does not make any reference to traditional fisheries management practices of indigenous peoples in the country. According to the law the use "all kinds of poisons" for fishing purposes is prohibited (Fiat Law on Fisheries Management and Administration, No.33 KRO.CHOR Chapter 2, Article 17, A; also new draft fisheries law maintains this formulation). There is no distinction between industrial chemical poisons that kill every animal and most of the plants and do not biodegrade, and natural substances from plants and trees, which are traditionally used selectively and, which biodegrade within hours.

Draft Sub-decree on Community Fisheries Development
Currently, a sub-decree on community fisheries development is being drafted. The draft in its present form puts strong emphasis on the role of DoF in facilitating community fisheries, rendering its application in Mondulkiri questionable as DoF does not have an office there. Furthermore, according to the draft only "Khmer citizens" (Article 18) are entitled to vote for and stand as candidates for election as members of the Community Fisheries Committee. Whether this provision excludes indigenous people is not clear; it does include the Vietnamese ethnic minority fishers, however.

Given the absence of the responsible authority, DoF, in the province, not surprisingly, law enforcement is very weak and only partly taken care of by other Government offices, such as the Forest Administration, or NGO initiatives (such as WCS).

Draft Protected Areas Law According to the latest drafts of the Protected Areas Law and the Ministerial Declaration on Southern Mondulkiri Biodiversity Conservation Project, the study area is located mainly within the Seima Biodiversity Conservation Area (SBCA) [O Am is predominantly in the Snuol Wildlife Santuary and so governed by the draft PA law and the Royal subdecree]. According to this legislation, the Forestry Administration is responsible for managing the area and ensuring that it is used sustainably for the development and livelihoods of the local communities in the area. Even though logging operations are currently suspended, legally, the SBCA is part of the Samling logging concession. Access to use and residence within the area are bound legally by the Land Law (Articles 23-28 and 138-141).

[47] "The Fiat Law defines the Inland Fisheries Domain as "all rivers, tributaries of rivers, lakes, streams, small rivers, canals, inundated forest areas or water channels, natural ponds, holes in the ground, which … [receive their] water from the river, tributaries of the rivers, lakes streams and small rivers." (No.33 KRO.CHOR, Phnom Penh, 9 March 1987

5 RECENT TRENDS

The study was undertaken at a moment of crisis. Livelihoods of Punong people have been affected by external factors outside the control of their families and communities. Major reasons for this situation include:

5.1 ACCULTURATION

There have been systematic initiatives to integrate Punong people into mainstream society since the colonial administration, motivated by the need for cheap labor and soldiers, and informal and ongoing pushes to claim land for plantations and logging by the Kingdom or national state (White 1996). For the Punong incipient "Khmerization" has translated into disregard for their cultural values, mistreatment, decimation of wildlife and loss of resin trees and land, exposure to religious beliefs unrelated to the ecology of the forests and being subjected to national laws with little or no consideration for their life style and needs for livelihoods. Often, Punong people express their feelings of being treated as second class people by the mainstream Khmer society. Khmers sometimes use the term "chunchiet" for Punong people and the word "Phnong" as derogatory for all tribal people - synonymous with uneducated, illiterate, and inferior people. The Punong feel disadvantaged because of their "lack of business experience. They are aware of their limited bargaining power and often feel 'cheated' in trading situations but also feel helpless to protect themselves" (White 1996: p.360).

Immigration

In the area of O Am and Chnaeng a significant immigration of people with different cultural identities and conflicting socio-economic interests took place after the re-integration of former Khmer Rouge soldiers into mainstream society. Large numbers of ethnic Cham as well as Khmer families immigrated from Kampong Cham provinces, settling along the new logging road in the West of O Am. Up to date, three Muslim mosques have been built in this area. The selling of forest land for clearing, settlement and, possibly, land grabbing has attracted and is attracting more and more people.

New religious mission

During the last decade the incursion of aggressive Christian religious missions has been furthering the break off from traditional belief and value systems. In particular, in one of the administrative sectors of O Am administrative village, Stieng indigenous people, but also some Punong and R'ong indigenous people abjured their traditional spirits.

Improved communication

Improved communication accelerates acculturation. Access to markets facilitate better prices of local farm and forest products. The huge potential of the forests for poaching and trading of wildlife, cutting of timber and clearing land for tree plantations is bringing in investment and increasingly indigenous people are actively engaged in exploiting it.

Decentralization process

The process of political and administrative decentralization, initiated since the commune council elections in 2002, has virtually led to a centralization process of, traditionally, largely decentralized Punong settlements. It also seems to mirror imperfections of governance. However, the decentralization process resulting in a centralization of political decision-making of Punong villages provides a potentially important platform for coordinating locally based management of natural resources at commune level.

Imperfect governance

Imperfect governance practices impact negatively not only on the natural resources

themselves but also on NRM processes that rely on engaging people and institutions at the various levels of management. The basic problem is that most government agencies present in the study area are accountable upward to provincial or national authorities rather than downward to indigenous communities.

Punong people and local authorities alike strongly complain about the involvement of armed forces (police, soldiers, border police and military police) in illegal logging, hunting and fishing operations. Complaints by local fishers to authorities, by lower ranking authorities to higher authorities, or by authorities from one sector to those from another are not yielding major results. Fishers and lower level players feel that they can do very little, if anything, to influence, let alone stop higher level players in fisheries. Influence, as perceived by fishers and local authorities alike, is exercised from above and accountability of government is very weak.

Though positive results of the FA/WCS patrolling teams are largely acknowledged by village and commune authorities, their credibility among villagers is weakened by the fact that they are seen letting poachers with backing from higher levels "off the hook". This is not only been reported by villagers but also confirmed by members of patrolling teams, who also express their frustration that arrested offenders are often freed by the courts.

5.2 Resource pressure

Loss of resin trees

The massive loss of resin trees to logging[48], and thus, loss of significant cash income, triggered a series of compensatory trends. The affected resin tappers turned to cutting rattan and bamboo as alternative products of the forest. Mostly younger people intensified hunting activities. Some affected resin tappers in O Am reported that they introduced cashew[49] trees on previously fallow land and whole families turned to wage labor. In the settlements in Andong Kroleong village, stealing of resin and establishing family companies for sharing resin collection have increased since people lost their resin trees. In addition, people engage increasingly in illegal activities, such as logging, hunting[50], and fishing with highly damaging fishing gears has taken place.

Illegal fishing

Fishing with grenades seems to be the oldest highly destructive fishing method in the region. Until recently, fishing with explosives was closely related to the history of armed conflict and the presence of police and soldiers. It has been reported that soldiers often invite villagers to fish with explosives in exchange for a share of the catch. Electrocuting of fish, the use of very strong chemical poisons (generally called "Anthrine") and the use of small stationary double wing bagnets made of mosquito netting ("du") have been introduced, reportedly, since the new millenium by Vietnamese poachers. These methods are also used by Cham and Khmer newcomers to the area and Punong people themselves have been experimenting with electric gears and "du", further eroding traditional conservation practices.

Illegal fishing activities are not limited to the study area. Illegal activities were reported across the lower reaches of the Chhlong river wide-spread, including electrocuting, large scale use of chemical poisons and the use of barrage with dai bagnet operations. Even if people in the study area were to succeed in managing their fisheries in a sustainable way it would help little or nothing if downstream (or upstream from a particular village) fish stocks and habitats were destroyed. However, with the absence of the Department of Fisheries in Mondulkiri there is no government agency that has a clear mandate and sufficient capacity to curb illegal fishing in that part of the catchment.

[48] Commercial logging by Samling ceased in 1999, however illegal logging has been an issue since.

[49] Cashew trees have been cultivated in the larger area more than a decade, but there are indications that Phunong people are increasingly planting them in fallow lands since losing resin trees.

[50] Hunting has traditionally been an important livelihood activity. In 1959 it was forbidden by the Forestry Law and regulated through the Decrees …….. thus, by default, illegalizing this livelihood strategy. Hunting as part of Phunong cultural heritage has been continuing until nowadays, however, increasingly as a source of attractive cash income due to lucrative wildlife trade (to Vietnam and China in particular)

6 Consequences for MANAGEMENT

6.1 Scope for fisheries management

As shown above, the traditional system of management of natural resources including fisheries resources by the Punong peoples was based on a differentiated set of territorial use rights and tenure. As observed elsewhere, management based on tenure can often adapt to a certain degree to the use of modern gear and cash economies, as access and compensation adjust accordingly. However, the adaptation depends to a large part on the resilience of the whole traditional authority structure in the face of change and the acceptance, of traditional management, by the state and the new administration. If traditional tenure is not recognized, then the practices of control and compensation are similarly ignored (COFAD 2003).

There is a gap between the formal fisheries law and regulations that give the broader framework for fisheries management in the country and the traditional management customs that worked over centuries in Punong society. The challenge stems from the complexity of traditional resource management systems already in place and the added demands when new arrivals (immigrants and armed forces alike) come into direct competition with the original residents for subsistence and commercial fishing.

Today, Punong villagers find themselves in a world of legal (and existential) uncertainties. Their perception of the "new order" is that the state laws are used by the powerful and (often armed) individuals for their own ends. There is increasing frustration among them for being harassed for allegedly disrespecting national laws, while at the same time the same law is not applied to members of mainstream society and those in charge of enforcing it. They perceive that laws have little meaning if they are widely ignored.

The increase of illegal activities carried out by outsiders and armed forces, in conjunction with the limited capacity of patrolling teams to enforce the law tend to contribute to an accelerating process of erosion of Punong cultural values and their traditional fisheries management regime. The general weakness of governance of mainstream society is felt more strongly by Punong villagers since they have less experience and confidence to in defending themselves. The capacity of Punong people to reinvigorate their cultural values and livelihood strategies will be decisive for their preparedness to defend their ancestral land area and its resources from outsiders.

The nexus between the current fisheries practice and traditional management also influences traditional decision-making patterns. As fish populations are perceived to decrease by many villagers, the willingness of Punong people to comply with local rules and regulations is lessening[51] . Only where the sense of community ownership is well developed and the community strongly supports local norms and rules individual villagers are more likely to abstain from engaging in illegal fishing[52]. If, however community support for traditional management practices weakens, illegal fishing is likely to increase as long as fishery resources are available. Consequently, the community's decreasing willingness to stop illegal fishers encourages others to take up illegal fishing activities.

[51] For example, in Andong Kroloeng a Commune Council member and in Purung a militia have been engaging in electric fishing. Thus, by their position within local authority structure they undermine local fisheries management regulations.

[52] This seems to be the case in Pupoanh village.

6.2 DECISION-MAKING PROCESSES

Findings of the field work underline the fact that people are becoming increasingly aware of fish resources being overexploited. To understand the reasons will hopefully lead to rethinking management and provide for social learning at individual as well as on institutional level.
At the moment, it appears that three possible scenarios can be visualized:

Scenario 1: Punong culture, value system and social cohesion are strong enough to survive and flexible enough to adapt to externalities. This will lead to innovation of approaches to cope with the new situation/trends while preserving the conservationist philosophy of their traditional use of natural resources and fish. This will, possibly, have positive spillover effects on immigrants and civil society.

Scenario 2: The culture of indigenous people suffers from external influences and people participate in the "run for fish". Fishers adapt new fishing practices while maintaining largely their traditional values.

Scenario 3: Punong communities succumb to external pressure and participate in the "race for the fish". As a consequence, their traditional values and fisheries management system disappear. Punong and other indigenous people have to compete with outsiders and police/military.
Their culture will gradually disappear.

Punong people have responded to the significant stress from outside by increased willingness to participate in the "race for fish" to the extent that resource use becomes largely uncontrolled.

In the following an attempt is made to understand the sphere of illegal fishing from the point of view of Punong people (emic view), referring to Dudley (2001).

Need for cash income
Generally, Punong villagers, in view of substantial loss of resin trees and the self-perceived decline in fish and wildlife availability, think that they do not have an adequate income[53] .

Findings of the field work indicate that, if people felt that their incomes were adequate, they would be less likely to engage in illegal fishing. Self-perceived drops in income level appear to have increased willingness to fish illegally. This willingness is a result of the "desired income ratio" (Dudley 2001), i.e. how people judge their actual income with regard to the desired income. The desired income ratio can, of course, change if the desired income changes, e.g. due to any increase of market prices for essential assets or food items, or the desire to acquire consumer goods, etc. Thus, as the income needs increase, the willingness to engage in illegal fishing will increase as well, depending on other options available. Once the desired income has been achieved, the willingness to fish illegally stabilizes unless influenced by other factors (e.g. drastic decrease in fish stocks, or loss of animal protein for household consumption without alternatives of replacement).

Competition with other illegal fishers
Illegal fishers from the outside, i.e. non-Punong people such as immigrants, armed forces (police, border police and soldiers) and people operating with the tacit agreement of local authorities seem to have influenced Punong to participate in illegal fishing.

Fishing by non-Punong completely disregards traditional use patterns of indigenous people, with no considerations for spirit sites or principles of sharing. The main goal is to extract as much fish as possible within the shortest possible time, mainly for cash income, and to a much lesser degree for their own consumption.

With improved transport to markets, some Punong have also started to follow the value pattern in illegal fishing activities.

[53] Little is known about local hunting practices and rules & regulations. Thus, it is difficult to assess, at this point, the contribution of hunting to the generation of cash income.

Initially, they acquired the technical skills as assistants to illegal operators from the armed forces, helping them to collect fish after grenade explosions or chemical poisoning, in exchange for a part of the catch, thus gradually losing remaining inhibitions based on their traditional management rules. As the actual number of illegal fishers in a village increase, the percentage of illegal fishers also increases. As a consequence, the willingness of villagers to engage in illegal fishing tends to increase at village level, if no other factors influence the outcome.

Lack of basin-wide approach to fisheries management

The decrease of fish stocks is not only caused by the activities of illegal and destructive fishing. Factors leading to a decrease of the recruitment capacity of fish stocks in other parts of the basin or the Mekong river system also have consequences that are felt in the study area. Increased fishing pressure and/or other development measures leading to habitat degradation (cutting of flooded forest, conversion of wetlands, use of agricultural pesticides, etc.) or disruption of the inter connectivity of vital fish habitats (construction of dams for irrigation or for electricity from hydro power) within the larger ecosystem is critical to conservation of fisheries resources in the study area.

However, some of the findings of this study indicate that conservation and sustainable use of the local ichthyofauna and its diversity can be achieved through locally applied management, by curbing fishing pressure and destructive fishing practices and by protection of critical habitats, in particular the deep pools[54] .

[54] Further research on the importance of deep pools and their inter-connectivity in a seasonal perspective is critical to understanding the Chhlong river catchment and its role in Cambodian fisheries in general. Preferably, research should be carried out in a way that it serves as a platform of intercommunication and information generation with local resource users and authorities alike (rather than limiting the research to extracting information without devolving it and "white-balancing" [re-assessing] it with them).

7 RECOMMENDATIONS

On the base of the findings of the study, a number of preliminary recommendations can be formulated:

- All efforts to facilitate sustainable resources need to address the sphere of local governance, including rule of law, transparency and accountability. In addition, improving environmental governance in the target area will have to fully take into account the idiosyncrasies of Punong and other indigenous people. The following steps are visualized:
  - Conduct participatory action research on conflict management and communication between stakeholders.
  - Facilitate opportunities for communication between Punong villagers and local government.
  - Bridge the gap between local villagers, the bio-diversity teams, local authorities, and armed forces.
  - Enforce bans on electro-fishing, grenades, and chemical poisoning.
  - Educate commune councilors about the Fisheries Law.

- These activities will require an understanding of surviving traditional management and knowl edge systems, eventually to be adapted, included in, and applied to locally developed and com munity-based management within the particular community, region or in the river basin at large. This implies that government (local and central) accepts the legitimacy of indigenous peoples' right to their ancestral land, their traditional system of management and their social and cultural institutions. To facilitate community participation in NRM it is necessary to:
  - involve communities in identifying potentials for CBNRM,
  - organize community fisheries and seek official sanction for a community role in enforcement. Begin by identifying those areas with the greatest poten tials.
  - help communities establish fish conservation areas, particularly in deep pools
  - produce communication tools (videos) in the Punong language on subjects relevant for community participation in NRM.

- Efforts by competent authorities to strengthen Punong cultural identity leading to conserving traditional management practices and regulations need to be put in place and provided with a legal basis. Efforts should include the acknowledgement of traditional production patterns as fishing with natural poisons as an environmentally sound fishing practice, for example. Most critical, however, will be the protection from attempts to take away their land (land grabbing, etc.) and seeking ways to resist or mitigate the external pressures that destroy their cultural identities (including hasy adoption of other cultural norms and religiousmconversion).

- The above recommendations could be accommodated if a rights-based approach to resource management to guide development agendas[55] would be implemented. This would imply obliga tory consultations of stakeholders in general and self-determination of indigenous peoples in particular. Many donors, such as UN organizations, DFID, Danida, among others are using this approach to shape

[55] The Cambodian Government has not yet ratified the Indigenous and Tribal Peoples Convention, 1989 (No. 169). The standards contained in ILO Convention No. 169 establish a basic framework for the protection of indigenous and tribal peoples under international law. Among others, Article 8 requires ratifying States to take indigenous and tribal custom and customary law into account when applying national laws and regulations to the peoples concerned. UN donor support provided advice to the Cambodian Government in connection with a National Policy on Highland Peoples Development. The support included capacity-building to foster dialogue between the Government of Cambodia and indigenous and tribal peoples, a crucial element of the national policy. support included capacity-building to foster dialogue between the Government of Cambodia and indigenous and tribal peoples, a crucial element of the national policy.

their programmes of assistance.

- The prerogative of a rights based approach would require the acknowledgement of the right of Punong to manage their fisheries and, if necessary, to exclude outsiders. As a result, Punong fisheries management practices would play an increasingly important role in decentralized, local government driven natural resource management in the area. Concrete steps would be to
  - document impacts of outsiders on Punong villages
  - seek official agreements excluding outsiders and immigrants from Punong village lands.
    This seems to be crucial because of their high potential to act as wildlife poachers, illegal fishers, illegal loggers and land grabbers.

- In parallel, WCS should review its procedures to assist in law enforcement to prevent illegal settling and overuse of resources by both villagers and outsiders, exploring bottom-up approaches to NRM. This implies advocacy of acknowledgement by Government of Punong ancestral rights and entitlements to use their communal lands and resources, giving due recognition to local management institutions and promoting their consideration in formal management plans. This implies WCS should readjust the current practice of participatory land use planning and consider local institutional identities (of, for example, Punong village boundaries as conceived by the villagers) and relationships between neighboring settlements within administrative villages.

- Local Government and line agencies should be assisted to improve their understanding and consideration of Punong people, their culture and traditions, in order to reaffirm Punong cultural identity and traditional authority. A roadmap to achieve this could include the following steps:
  - Conduct participatory research on Punong cultural institutions and tradi tional authority.
  - Promote the use of Punong language, through audio-visual materials in the Punong language and provide learning platforms for WCS staff to learn this language.
  - Reinforce traditional village authorities by supporting intergenerational learning and keeping the negative effects of external interference to a minimum.
  - Help the Punong to document their traditional management systems in a way that is useful to them and allows them to improve adapt, and apply these systems to the changing condtions within their communities.
  - Conduct participatory action research on Punong traditional natural resource management systems regarding fish and other resources (since they usually evidence quite some overlapping).
  - Organize meetings for people from dif ferent areas to reach common understanding on traditional managem ent systems.
  - Assist Punong communities to map fishing grounds, spirit sites, important resource areas, in particular deeppools.
  - Reaffirm Punong traditional manage ment systems, in particular the use of natural poisons as an environmentally sound fishing practice.
  - Seek official acknowledgement of the right of the Punong to manage their fisheries according to traditional systems and to exclude others (seek communal title of fishing grounds).
  - Help Punong communities title their traditional lands, refocusing attention on traditional village units instead of administrative villages. Traditional management of natural resources has been confined to traditional village institutions and not to superimposed village structures.

Village institutions have to be the starting point if traditional management is to contribute to natural resource management in the newly defined entities.

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Glossary

English	*Punong (transcript)*	*Khmer*	*Khmer (transcript)*	*Remark*
Cast net	cha:l / chea:l	សំណាញ់	samnanh	
Fishing by hand	nhepka: mati:	ចាប់ដោយដៃ	chap doy dai	
Deep Pool	klong	អន្លង់	anlung	
Fish paste	kaóm	ប្រហុក	prahoc	
Fishing with natural poisoning	krao ca	បំពុលដោយសំបកឈើ	bompuldoysam bokchier	
Grid trap	n'dóh	សាប	seb / sab	
Hand-held lift net	yú	ឆ្នុកស្រែ	chhnouk sre	
Hand scooping basket	nérr, k'nérr	ឈ្នាង	chneang	
Hook (simple)	n'da:r	សន្ទូច	santouch	
Hook long line	rru'o:ng	សន្ទូចរនង	santouch ronong	
Moon	kái	ព្រះច័ន្ទ	preah chann	
Mountain / Hill	k'norr	ភ្នំ	phnom	
Plunge basket	'ngrrút	អង្រុត	angruth	
Python snake	glán	ពស់ថ្លាន់	púh thlán	
Single hook	n'da:rr	សន្ទូចវ៉ាត់	santouch plae muoy	
Single hook set pole and line	darrdorr	សន្ទូចបង្កៃ	santouch bongkai	
Smoked fish with lemongrass	chukka: n'haimlang	ត្រីឆ្អើរស្លឹកគ្រៃ	trey ch'ae slek krey	Highly appreciated dish
Smoked fish with ginger	chukka: n'haimcha:r	ត្រីឆ្អើរខ្ញី	trey ch'ae kney	Highly appreciated dish
Spirit	brráh	ព្រះ	preah	very strict spirit
		អ្នកតា	neak ta	Village guardian spirit
Swamp	yu:d	វាលភក់	vielpouk	
Basket trap	pa:m	លប	lop	
Vertical vase trap	bong	តុំ	paong/chu/tom	
Waterfall	leng	ទឹកជ្រោះ	tek chruh	
Water pumping (fishing)	cha:t ca	បាចទឹក	bach tek	
Wedge cone trap	brray		leay	
Cone trap	sró:		leay	
Worm (for bait)	bran, brran phoi, brran thang			

Annex1 Fish of the headwaters of Chhlong River[56]

Scientific name	*Khmer name*[57]	*Punong name*[58]	*Remarks*
Order TETRAODONTIFORMES			
Family **TETRAODONTIDAE**			
Genus ***Monotreta***			
Monotreta fangi	Trey Kampot	Ca Pók	In O Huot, not in O Kanong, not in O Pórr. Fished with castnet
Family **CLARIIDAE**			
Genus ***Clarias***			
Clarias batrachus	Trey Andaing Reoung	Ca N'tarr	In O Kanong, O Pórr. It is a big fish available in both dry and rainy seasons. Caught with gillnets, hooks with worm as bait. With natural poison difficult to catch, it is very strong and does not die easily.
Clarias macrocephalus	Trey Andaing Toun	Ca N'chék	In O Chlong, O Kanong, O Pórr, O Rona. Only in deep pools where there are big rocks and they can hide under. Fished with hooks and gillnets but difficult to catch with natural poison.
Family **SYNBRANCHIDAE**			
*Genus **Monopterus***			
Monopterus albus	Antung	N'dúng	In ponds like Trapeang Heav, in rivers O Chlong, O Rona. Usually they live in holes or in swamps. At beginning of rains they come up. In October they migrate down like other fish. Fished with gillnets, hooks and eel hook and bare hands.
*Genus **Ophisternon***			
Ophisternon bengalense	Antong	N'dúng	In ponds like Trapeang Heav, in rivers O Chlong, O Rona. Usually they live in holes or in swamps. At beginning of rains they come up. In October they migrate down like other fish. Fished with gillnets, hooks and eel hook and bare hands.
Order CIPRINIFORMES			
Family **CYPRINIDAE**			
Subfamily DANIOINAE			
Tribe DANIONI			
*Genus **Luciosoma***			
Luciosoma bleekeri	Trey Dong Dao, Trey Bang Kouy	Ca Chengroloeng	In O Pórr, O Kanong, O Chlong but not very frequent. Migrates up waterfalls and is found in every deep pool. It can swim very fast and gets stuck in gillnets quickly. Fished with castnet, gillnet and natural poisoning.
Luciosoma bleekeri	Trey Dong Dao	Ca N'péh Thong	
*Genus **Rasbora***			
Rasbora dusonensis	Trey Changva	Ca R'tóng	In O Chlong, O Kanong, O Pórr and O Rona rivers but also in recession ponds. Has a lot of eggs. Fished with hook, gillnet, castnet and natural poisoning. Boiled fish has a very good taste, is also excellent for prahoc because it has a small stomach.
Rasbora hobelmani	Trey Changva		
Rasbora myersi	Trey Changva		

[56] The present list of fish species is considered incomplete, due to the limitations of the methodology. Further taxonomic, biological and environmental studies are deemed useful. The species names here are provisional.

[57] Mainly, maintaining orthography of Rainboth 1996

[58] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

Scientific name	*Khmer name*[59]	*Punong name*[60]	*Remarks*
Rasbora paviei	Trey Changva Chhnot	Ca R'tóng	In O Kanong, O Pórr, O Chlong, O Rona, also in recession ponds. Migrate and have eggs up here, eats everything in the water, including monkey shit. Fished with gillnet, castnet, hooks and only with very strong natural poisons
Rasbora tornieri	Trey Changva Moul	Ca Tang	In O Kanong, O Pórr, O Chlong, O Rona, also in recession ponds. Migrate and have eggs up here, eats everything in the water, including monkey shit. Fished with gillnet, castnet, hooks and only with very strong natural poisons
Subfamily CYPRININAE			
Tribe CYPRININI			
Subtribe TORES			
*Genus **Probarbus***			
Probarbus jullienni	Trey Trosok	Ca Pong	In O Pórr, O Kanong, O Chlong. Found as big as ½ kg in deep pools under big rocks. Lays eggs here. Fished with gillnet, castnet and natural poisons in the dry season. In Rainy season with hook.
Probarbus labeamajor	Trey Trasok Sor	Ca Yóng	O Pórr. Has eggs in May/June. Up to ½ kg big. Likes to stay under rocks. Fished with gillnet, natural poisons and castnet. Cover the hole rock with castnet, then remove the rock and get the fish beneath.
Genus ***Tor***			
Tor sinensis			
Tor tambroides	Trey Khaor	Ca Héau	In O Pórr, O Kanong, O Chlong, O Rona. There are a lot of them in these rivers. Fished with castnet and natural poisoning (but it is very hard to die with natural poisoning). Mainly it is caught with hook and a wild red fruit "plae gram" as bait, it reacts very quickly with this bait.
Tribe SYSTOMINI			
Subtribe OSTEOBRAMAE			
*Genus **Cyclocheilichthys***			
Cyclocheilichthys repasson	Trey Sroka Kdam	Ca Chérr	In O Pórr. O Chlong, O Kanong, but not in O Rona. Has eggs and migrates like the other fish. Fished with gillnet, castnet, hooks and natural poisoning.
Cyclocheilichtys amatus	Trey Pkha Ko	Ca R'báe	In O Pórr, O Kanong, O Chlong, O Rona. Feeds on algae. Migrates and lays eggs up here. Fished with gillnet, castnet and natural poisoning (not with hooks).
Cyclocheilichthys amatus	Trey Pkhar Ko	Ca Ché:rr???	All three fish are know here in the area (O Chlong, O Pórr, O Kanong, O Rona) but he doesn't remember the names. All migrate and have eggs up here. Fished with castnet, gillnet and natural poisoning.
Cyclocheilichthys lageri	Trey Sroka Kdam	Ca Pum	In headwaters everywhere, migrate up and down between deep pools, and some stay there in dry season. Fished with gillnets, cast nets and natural poisoning.
Cyclocheilichthys repasson	Trey Sroka Kdam	Ca N'rrák	In headwaters everywhere, migrate up and down between deep pools, and some stay there in dry season. Fished with gillnets, cast nets and natural poisoning.
Genus ***Puntioplites***			
Puntioplites falcifer	Trey Chrakaing	Ca R'pai	In O Pórr, but not in O Kanong. Carries eggs when it migrates up-stream. Fished with hook, gillnet, castnet and natural poisons.
Subtribe SEMIPLOTI			
*Genus **Hypsibarbus***			
Hypsibarbus lagleri	Trey Chhpin	Ca R'páeh	In O Pórr, O Kanong, O Chlong, O Rona. Not found in ponds. Migrate and lay eggs up here. Mostly fished with gillnet, castnet, hook and natural poisoning.
Hypsibarbus lagleri	Trey Chhpin	Ca R'páeh	In O Pórr, O Kanong, O Chlong, O Rona. Not found in ponds. Migrate and lay eggs up here. Mostly fished with gillnet, castnet, hook and natural poisoning.

[59] Mainly, maintaining orthography of Rainboth 1996

[60] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

Scientific name	*Khmer name*[61]	*Punong name*[62]	*Remarks*
Genus ***Propuntius***			
Propuntius deauratus	Trey Lolok Sor	Ca H'eav	Everywhere. Migrates. Fished with gillnets, hooks, castnet. Some remain in deep pools in dry season.
Subtribe SYSTOMI			
*Genus **Hampala***			
Hampala dispar	Trey Khmán	Ca Chrók	In O Pórr, O Kanong, O Chlong, O Rona. Eats everything and migrates as other fish, has eggs up here. Fished with gillnet, castnet, hook and natural poisoning.
Hampala macrolepidota	Trey Khmán	Ca Chrók	
*Genus **Systomus***			
Systomus binotatus (Puntius binotatus)	[no Khmer name in Rainboth 1996]	Ca R'pól	In O Pórr, O Kanong, O Chlong, O Rona. Also found in ponds. Migrates and lays eggs up here. Can pass waterfalls. Fished with gillnet, castnet and natural poisoning.
Systomus orphoides (Puntius orphoides)	Trey Ampil Thom	Ca Pum	In O Pórr, O Kanong, O Romanh, O Chlong, O Rona, O Ngeun. Fished with gillnets, castnets, etc.
Tribe CATLINI			
Genus ***Thynnichthys***			
Thynnichthys thynnoides	Trey Linh	Ca Chap	In O Pórr, O Kanong, O Chlong. Occurs below the first down-stream waterfall of each of the rivers. Migrates down in groups in October. Fished with lop, castnet, gillnet.
Tribe LABEONINI			
Subtribe LABEONES			
*Genus **Dangila***			
Dangila lineata	Trey Khnong Veng	Ca Phork	In O Kanong, O Pórr[63]. Scaly fish, migrate up with the first rains and has eggs in May/June. Fished with castnet, hooks with worms as bait and gillnets. With natural poisons it dies very fast.
Dangila sp.cf.	Trey Khnong Veng	Ca Chérr	In O Kanong, O Pórr. Migrate like other fish. Feeds on algae on the rocks. Fished with castnet, gillnet and single hook
Dangila Spilopleura	Trey Ach Kok	Ca Tók	In O Pórr but not in O Kanong. Migrate like other fish. Fished with gillnets, castnet and natural poisoning. Not fish with hooks.
*Genus **Henicorhynchus***			
Henicorhynchus caudimaculatus	Trey Riel		Migrate by group only at night. Is one of the first fishes to migrate up. In Sept/Oct with clear weather, open sky and sun, no rain they migrate downstream. In April/May they migrate upstream very fast. They cross waterfalls and rapids. Fished with gillnet, castnet and natural poisoning. Upstreammigration lasts 10-14 days.
Henicorhynchus cryptopogon	Trey Riel	Ca N'rriel	Migrate by group only at night. Is one of the first fishes to migrate up. In Sept/Oct with clear weather, open sky and sun, no rain they migrate downstream. In April/May they migrate upstream very fast. They cross waterfalls and rapids. Fished with gillnet, castnet and natural poisoning. Upstreammigration lasts 10-14 days.
Henicorhynchus simanensis	Trey Riel	Ca Chap	Migrate by group only at night. Is one of the first fishes to migrate up. In Sept/Oct with clear weather, open sky and sun, no rain they migrate downstream. In April/May they migrate upstream very fast. They cross waterfalls and rapids. Fished with gillnet, castnet and natural poisoning. Upstreammigration lasts 10-14 days.
*Genus **Lobocheilos***			
Lobocheilos davisi	[no Khmer name in Rainboth1996]	not known	In O Chlong, O Pórr, O Kanong and O Rona.
Lobocheilos melanotaenia	Trey Changwa Ronoung	Ca Chráng	In O Rona, O Chlong, O Pórr, O Kanong. Only in rivers, not in recession ponds. Fished with gillnet and castnet, but not with hooks (feeds on algae and water weeds).

[61] Mainly, maintaining orthography of Rainboth 1996

[62] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

[63] O Kanong and O Poa have all kinds of fish. Not though the ponds. Fish feed on water grass and algae.

Scientific name	Khmer name[64]	Punong name[65]	Remarks
Lobocheilos quadrilineatus	[no Khmer name in Rainboth 1996]		
Genus ***Morulius***			
Morulius chrysophekadion	Trey K'aek	Ca Tokna:k	In O Pórr, but not in O Chlong. Lives under big rocks and feeds on algae and water weed. It stays in deep pools and does not migrate. Some fish as big as 1 kg. Fished with gillnet, castnet and natural poisoning.
Genus ***Osteochilus***			
Osteochilus hasselti	Trey Króh	Ca Cherr	Everywhere
Osteochilus waandersi	Trey Króh	Ca Klóng	In O Pórr, O Kanong, O Chlong, O Rona. Small sized fish. Migrates and lays eggs here. Fished with gillnet, castnet and natural poisoning.
Osteochilus waandersi	Trey Króh	Ca Klóng	In O Pórr, O Kanong, O Chlong, O Rona. Small sized fish. Migrates and lays eggs here. Fished with gillnet, castnet and natural poisoning.
Subtribe GARRAE			
Genus ***Crossocheilus***			
Crossocheilus reticulatus	Trey Changwa Chunchuok	Ca Ndrúng	In O Pórr, O Kanong, O Chlong, O Rona. Eats water weed and algae on the rocks. Fished with gillnet, castnet and natural poisoning (not with hook).
Genus ***Eplazeorhynchos***			
Epalzeorhynchos frenatum	Trey Kuol Chek	Ca N'rúng	In O Pórr, O Kanong, O Chlong, O Rona, not found in recession ponds. Migrates like other fish, lays eggs up here. Feeds on rock grass and algae. Fished only with gillnet, castnet and natural poisoning.
Genus ***Garra***			
Garra fasciacauda		Ca N'rrong	Everywhere

Family **COBITIDAE**			
Subfamily BOTIINAE			
Genus ***Botia***			
Botia beauforti	Trey Kanchrouk	Ca Loebmihárr	In O Pórr, O Kanong, O Chlong, O Rona. Fished with single hook, gillnet, castnet and natural poisoning
Botia helodes	Trey Kanchrouk Chhnot	Ca Loebmihárr	ibid. There are a lot in O Pórr and O Kanong
Botia lecontei	Trey Kanchrouk Loeung	Ca Loebmihárr	In O Chlong, O Kanong, O Pórr. Migrates like other fish and lays eggs up here. Feeds on worms, insects and hides under rocks. It is a very delicious fish because it has a lot of fat. Fished with hook, gillnet, castnet and natural poisoning.
Botia modesta	Trey Kanchrouk Krohom	Ca Loebmihárr	In O Chlong, O Kanong, O Pórr. Migrates like other fish and lays eggs up here. Feeds on worms, insects and hides under rocks. It is a very delicious fish because it has a lot of fat. Fished with hook, gillnet, castnet and natural poisoning.
Botia morleti	Trey Kanchrouk	Ca Loebmihárr or Ca Neanghach	In O Chlong, O Kanong, O Pórr. Migrates like other fish and lays eggs up here. Feeds on worms, insects and hides under rocks. It is a very delicious fish because it has a lot of fat. Fished with hook, gillnet, castnet and natural poisoning.

[64] Mainly, maintaining orthography of Rainboth 1996

[65] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

Scientific name	*Khmer name*[66]	*Punong name*[67]	*Remarks*
Subfamily **COBITINAE**			
Genus ***Acanthopsoides***			
Acanthopsoides delphax	[no Khmer name given in Rainboth 1996]	Ca Chóat	In O Kanong. Stay in sandy underground, can dig under sand very quickly. Caught only by water pumping in dry season or with scooping baskets (chneang), not wit hooks or gillnets. Difficult to get with natural poisoning because it hides under the sand and in holes in the rocks.
Genus ***Acantopsis***			
Acantopsis sp.1	Trey Ruchek	Ca Choit	In O Kanong, O Pórr, but not in O Chlong. It lays eggs here but it is not clear if it migrates or not. fished with lop and tru and mainly with natural poisoning.
Acantopsis sp.2	Trey Ruchek	Ca Choit	
Family **GYRINOCHEILIDAE**			
Genus ***Gyrinocheilus***			
Gyrinocheilus pennocki	Trey Smok	Ca Chórr	In O Pórr, O Kanong, O Chlong, O Rona. One fish gets as big as 1 kg. Migrates and lives in small holes in the riverbank or rocks. Fished with gillnet, castnet and natural poisoning. Not fished with hook
Order SILURIFORMES			
Family **BAGRIDAE**			
Genus ***Bagrichthys***			
Bagrichthys macracanthus	Trey Chek Thom	Ca Yís	In O Pórr, O Kanong. Only small size fish living under rocks. Fished with hook, castnet, gillnet and natural poisoinig.
Genus ***Mystus***			
Mystus filamentus	Trey Tanel	Ca Mbóng Or Ca Lang	In O Kanong, O Pórr, O Chlong, but not in O Rona. Here it is not found in Trapeangs, in Koh Nheik it was fished also in trapeangs. Up to ½ kg big, has eggs in May. In rainy season only fished with hook, but not a lot. In dry season with gillnet, single hook and castnet and natural poisoning
Mystus nemurus	Trey Chhlang	Ca Mbóng	In every river
Mystus singaringa	Trey Kanchóh	Ca Kráe:	In O Pórr, O Kanong, O Chlong, but not in O Rona. Not in recession ponds. In Koh Nheik found in ponds. Migrates as other fish and lays eggs up here. Fished with hook, castnet, gillnet and natural poisoning.
Family **SILURIDAE**			
Genus ***Ompok***			
Ompok bimaculatus	Trey Kromom	Ca M'búel	In O Pórr, O Kanong, O Chlong, but not in O Rona. Migrates and lays eggs up here. Found in recession ponds and in deep pools hiding under rotten tree stumps. Has a lot of eggs. Is not a very big fish and is caught more in dry season with hooks, castnets, gillnets and natural poisoning.
*Family **PANGASIIDAE***			
Genus ***Pangasius***			
Pangasius conchophilus	Trey Ke, Trey Pra Ke	Ca R'choeng	In O Pórr, O Kanong, O Chlong. Migrates as the other fish and lays eggs up here. Is not a very delicious fish. Fished with hook, castnet, gillnet and with natural poisoning it dies very quickly.
Family ***BELONIDAE***			
*Genus **Xenentodon***			
Xenendoton cancila	Trey Phoung	Ca N'lai	In every river. Fished only with natural poisoning

[66] Mainly, maintaining orthography of Rainboth 1996

[67] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

Scientific name	*Khmer name*[68]	*Punong name*[69]	*Remarks*
Family **MASTACEMBELIDAE**			
Genus ***Macrognathus***			
Macrognathus maculatus	Trey Kchhoeung	Ca Cháet	In O Chlong, O Pórr, O Kanong, O Rona rivers, but not in trapeangs. Biggest fish is ½ kg. Migrates and lays eggs up here. Fished with castnet, gillnet and natural poison (although it takes time to die, does not die very quickly). It is easy to catch with single hook since it comes very fast to eat the worm bait.
Macrognathus spp.	Trey Kchhoeung	Ca Bae	In O Pórr, O Chlong, O Kanong. Is bigger than Ca Cháet, as big as 1 kg, Hides under rocks or under leaves on the bottom of the water and can dig under sand. Fished with hook, gillnets and natural poisoning.
Genus ***Mastacembelus***			
Mastacembelus armatus	Trey Kchhoeung	Ca Páeh	
Mastacembelus erythrotaenia	Trey Kchhoeung Phka	Ca Kot	In O Chlong and other rivers. Fished with natural poisoning.
Mastacembelus favus	Trey Kchhoeung	Ca Chot or Ka Páeh (unclear name)	In O Chlong, O Pórr, O Rona, O Kanong. When it is young it has a different color than as an adult fish. Fished with hook and natural poisoning.
Order **PERCIFROMES**			
Suborder PERCOIDEI			
Family **CHANNIDAE**			
Genus ***Channa***			
Channa limbata (Channa orientalis)	Trey Ksan	Ca N'yút	In head waters of O Tru, O N'dong. Available during the whole year in deep pools hiding under the rocks. Fished with hooks and water pumping in the dry season.
Channa micropeltes	Trey Diep (juvenile), Trey Chhdao (adult)	Ca N'doit Ón	In O Pórr only below the first down-stream waterfall (Leng Mahók). Sometimes this fish eat its own offspring. Fished with gillnet and most importantly with hook with small life fish as bait or worms, and natural poisoning.
Channa lucius	Trey Kanhchorn Chey	Ca N'doit Ón Krák	In O Pórr, O Kanong, O Chlong, but not in O Rona and not in ponds. Fished with hook with life fish fingerlings, also with castnet, gillnet and natural poisoning.
Channa striata	Trey Phtuok (juvenile) Trey Róh (adult)	Ca N'kón	In O Pórr, O Kanong, O Chlong, O Rona. Fished with hook and castnet. Natural poisoning does not affect it.
Family **NANDIDAE**			
Genus ***Pristolepis***			
Pristolepis fasciata	Trey Kontróp	Ca Krób	In O Pórr, O Kanong, O Chlong, but not in O Rona. However, also in ponds. Some fish migrate, others don't migrate. Sept/Oct. down migration. Up-migration is not exactly known. Feeds on insects, shrimps and small fish. Fished with castnet, hook, gillnet and natural poisoning.
Suborder GOBIOIDEI			
Family **ELEOTRIDAE**			
Genus ***Oxyeleotris***			
Oxyeleotris marmorata	Trey Damrey	Ca Ondoit Onh	In O Pórr. Migrates. Gets as big as 1 kg, has a lot of eggs. Eat its own offspring fingerlings. Fished in dry season with "bonkai" hook with small fish as bait (live bait fingerling of trey changva, trey chlang. Bait collected with scooping basket)

[68] Mainly, maintaining orthography of Rainboth 1996

[69] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

Scientific name	*Khmer name*[70]	*Punong name*[71]	*Remarks*
Suborder ANABANTOIDEI			
Family **ANABANTIDAE**			
Genus ***Anabas***			
Anabas testudineus	Trey Kranh Srae	Ca Kranh	In trapeangs in Keo Seima and a lot of them in Koh Nheik

Family **BELEONTIIDAE**			
Genus ***Trichogaster***			
Trichogaster trichopterus	Trey Komplienh Samrai	Ca Changmat	In O Pórr, but not in O Kanong or O Rona. Lives in deep pools, eats everything, migrates like other fish and is not very big.

Family **SILURIDAE**			
Genus ***Wallago***			
Wallago attu	Trey Sanday		
Wallago leeri	Trey Stuok or Trey Tuok		
Family **CYPRINIDAE**			
Tribe CATLINI			
Genus ***Catlocarpio***			
Catlocarpio siamensis	Trey Kolreang		
unidentified	Trey Chóh	Ca Chúrr	Everywhere. Comes up in May/June to spawn here. In November migrate downstream

Other aquatic animals identified by fishers in the study area are turtles as follows:

Scientific name	*Punong name*
Batagur baska	Cob Kraeng
Callagur borneoensis	Cob N'dak
Cuora amboinensis	Cob Ab
Cuora trifasciata	
Cyclemys dentata complex	Cob Rr'há:rhách
Geoemyda spengleri	
Heosemys grandis	Cob Kokol
Hieremys annandalii	Cob Rolung
Notochelys platynota	
Trachemys scropta elegans	
Indotestudo elongate	Cob H'kung
Manouria emys	Cob H'kung
Amyda cartilaginea	Cob Kapa:

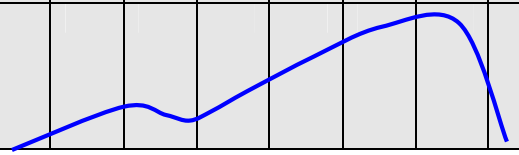
Note: According to WCS, some of the species identified by fishers seem to be highly unlikely to occur in the study area. Further surveying would be required.

[70] Mainly, maintaining orthography of Rainboth 1996

[71] Punong language does not have a script. Here a phonetic transcript is used to name the fish species in Punong language.

Annex 2 Seasonality of sources of food

					M	J	J		S	O	N	D	Remarks
COLLECTION OF FOREST PLANTS													
Young bamboo													Most delicious
Young rattan													
Wild mango													
Kui fruit													[Could not be clearly identified in Khmer or scientific names]
"Tumpeang bai chu" (k.) or "Lung dóng"(p.)													
Saumau prey													
Plae pniu													
Wild potatoe													Only dug out and eaten when short of rice.
K'duoch													Needs to be processed: cooked, put 2 days into flowing river water, cooked again. Then it is poison-free.
Dom kóp													Tree, red wood; picked wood is put into rice wine. Also used as infusion for women after delivery
COLLECTION AND HUNTING OF WILD ANIMALS													
Wild cow													Hunted anytime
Soft shell turtle													
Land turtles													
Monitor lizard													In dry season grass land is burnt down and as a consequence lizards are collected. Also dogs get them.[72]
Water lizard													
Mouse deer													
Wild pig													Not particularly hunted but caught with snares set around chamkar fields as protection measure
Deer													Deer comes to eat young bamboo. People who don't have chamkar fields like to hunt the whole year round.
Donkau dueng													Ant living in dead wood after clearing chamkar land (pon swa, rokha and pon wood). People can only collect this ant from the trees rotting on their own chamkar land, not from somebody's else field.

Products	J	F	M										Remarks
(schematic)													
AGRICULTURAL ACTIVITIES													
Cleaning land for rice													
Up-land rice broadcasting													
Rice harvest													
Corn harvest													
Banana harvest													After planting they have to wait 7-8 month for 1st harvest
Vegetables (cucumber, pumpkin)													
Cashew nut harvest													
Preparation of new chamkar land													Before preparing new chamkar land take one month rest after rice harvest.
cut small trees													
cut big trees													
burn branches													
start planting													

[72] According to accounts from WCS and its patrolling teams lizards are mainly caught in the early wet season.

ANNEX 3 FISHING GEARS[73]

Essentially, a fishing gear and its use represent a decision of the fisher. This decision is made up by local knowledge and perceived needs. On the one side the fisher puts into practice his (traditional) ecological knowledge about the fish habitats, fish biology of the different species, their feeding, and spawning and migration behaviors in order to shape or select the gear to be used. On the other hand, the fisher's decision takes into consideration his personal, family and community needs regarding household consumption, social obligations, cash income and barter opportunities. Needs are then matched with local regulations (including respect to the spirits, taboos, communal fishing arrangements, etc.), and, where they are in place, laws and decrees formulated at a national level (Deap et al. 2003).

Gillnets

Until the introduction of nylon gillnets in the 1950s and early 1960s Punong people used to weave their own gillnets from cotton and fibers twisted from "thmey" plant.

Today, nylon nets (together with hook and lines) are the most common gears and quasi standard equipment of every (fishing) household in the whole river basin. In the study area mesh sizes of 1 to 2.5 inches are used most frequently. A set of gillnet (called "dai") is commonly between 12 and 25 meters long and 1 to 1.5 meters high. The inferior border of the gill net is strengthened with 2 mesh rows of plastic meshes integrating small lead rings.

One fisher usually uses 3 to 4 dais of gill nets separately. Gillnets are only used as stationary nets, never as drift nets as water currents would immediately entangle the net and render it useless.

Most frequently, they are used as surface nets in calm waters in recession ponds or in river bows when it does not rain. Only in deep pools they are sometimes used as bottom set nets. However, the fisher will need to assure that the net does not hook up on the rocky bottom. In larger deep pools fishers may use bamboo rafts, composed of up to 20 bamboo poles, to extent their nets diagonally across the river allowing a certain number of fishers to cast their gear parallel to each others nets, at a minimum distance of five meters. At the end of each net they use stones or wooden poles are used to fix the net at the river bank.

The floating bamboo rafts only serve as operating platforms. Usually, there is only one such platform per deep pool. Even though the raft is constructed and "owned" by an individual fisher, any other fisher is entitled to use it whenever he needs it. However, the constructor-owner has the priority use-right and other fishers would need to the raft as soon as he needs it.

As a light fishing gear, the gillnet is very handy to be taken along during resin tapping trips, in particular it these trips imply to stay over for one or more nights in the forest. Before starting his tapping work the resin taper may set out a gillnet in a nearby creek, and upon his return he will collect the catch.

At the lower O Pórr resin tapers from Snuol district in Kratie are reported to fish intensively during most time of the year and process fish paste right at the spot. For this purpose couples undertake this type of resin-collection-cum-fishing operation together. While the man collects resin, the woman operates not only the gill net but may engage in fishing with hooks and set out traps.

[73] The fishing gears documented here are partly historical gears or rarely used.

Hooks

Fish hooks are the second most common fishing gear in the study area. Traditionally, they were fabricated by local blacksmiths from pieces of iron. During the French protectorate, industrially made hooks were introduced. They are being used as single hook attached to a fishing rod, hand line, long line, and single hook set pole and line. A special application is the single hook line for eels. All hook gears are typically operated during the rainy season.

The *common single hook fishing rod*, using hook numbers 7 to 12, is most widespread in the study area and largely, but not exclusively used by women and children. The most frequent bait are two types of earth worms, locally called "branlung phoi" and "branlung thang". Fish caught with hooks are kchoeung, kchós, chhlang, kcheng, kanchós choa (most important target fish for hooks), changva, kmagn, kontrop, ptuóh, mboung, taoun, kaháe, saka, chhpén, kró, andaing, ros, etc. (see Annex 1).

Traditionally, Punong fishers used to operate ***eel hooks***. After localizing an eel hole in the riverbank just beneath the water surface the fisher pushed the eel hook with bait (worm) around 25cm into the eel hole. When he noticed that the eel took on the bait hauling it deeper into the bottom of its hole he waited a prudential while until the eel was quiet, a sign that it was feeding on the bait. Then, with a sudden pull he hooked up the eel and pulled it out. This way of catching eels is not practiced any more today, and the experts in using this technique died already.

Rarely, ***hook hand lines*** are used without rods. Only at high riverbanks close to deep pools or waterfalls they are appropriate as they allow for easier handling of the hook. In the middle reaches of the Chlong river basin the fishing line with a big single hook (#2, #3 or #4) is attached to a tree stem or branch at the riverbank targeting big fish species at the bottom of the riverbed.

Single hook set pole and line, called "darrdorr", is used at the edge of rice fields (Deap et al. 2003: p.76) and, alternatively, at the edge of the river with soft earthen riverbanks and calm water currents.

"Santouch bonkai chro:m"[74] . is a ***multiple hook set pole line***. Basically, this gear consists of a hand pole and a line, its length depending on the depth of the water body where it is used, attached to it. On the end of the line a small tree branch is fixed carrying 5-6 drop lines (10-15cm long) with one hook each. Usually, the gear is fixed at the fishing ground itself: the branch has to be fresh, and it needs to be adapted to the specific fishing ground, length of the line, the length of the pole and the length of the drop lines need to be adjusted according to the shape of the branch selected. A sinker stone has to be selected according to the size of the branch and the depth of the water body that is being targeted, the stone has to compensate the buoyancy forces in the given fishing situation (currents, size of branch).

The gear is used in January / February, preferably in deep pools where there are a lot of rocks, and during night time. The fisher submerges this gear into deep pools letting it down to the bottom of the pool. All sorts of fish, hiding in between the rocks are caught with this gear.

The ***hook longline***, called "rrúo:ng" is less frequently used in the study area. Generally, it comprises between 20 and 30 hooks of size number 5 to 10. It is operated as surface long line along river banks and on the edge of recession ponds. Fish catches are higher after rains when fish is seeking feed in freshly inundated land. The gear catches basically the same fish as single hook rod. Occasionally, also soft shell turtles get hooked up. Hook longlines are subject to borrowing procedures within villages. One

[74] This gear does not have a specific Punong language name. It is also called "darrdorr".

third or one fourth of the catch will be given to the owner of the gear if there is a big catch. If the catch is just sufficient for one meal of a family, the gear operator does not need to share part of his catch with the owner.

A ***longline with multiple barbless rip-hooks*** is used in deep pools that are covered by trees and, thus, provide shady cool places preferred by softshell turtles. The long line is fixed from a nearby tree to another branch or tree at the opposite riverbank. Around 30 barbless hooks (size Nr. 6) are attached to 15cm long drop lines each at a distance of 1cm to each other, in the middle of the long line. The fisher positions the hooks just below the surface water. Above the hooks a bait, such as a small dead animal, preferably a rotten cadaver of a dead dog, is hung up. Soft shell turtles, crocodiles and water lizards jump out of the water to set at the bait and their feet get hooked up in the rip-hooks. This technique is claimed to have been introduced from Vietnam.

Barrages

Formerly, small barrages seemed to have played an important role in the study area. The size of the barrage corresponded with the size of the stream to be fished. The barrage could be used with fish traps attached to the inner wall, or with bagnets, or with a grid platform. They were set up at the early recession period from October to November. Informants suggest, that nowadays its use is rather limited, small blocking devices made of palm leaves and small bamboo fences are occasionally being used in small creeks in the headwaters for a short period of time.

In the middle reaches of the river basin it could be used until December. Barrage fishing was the second most important source of fish for fish paste production.

Covering and lifting devices

The cast nets used in the study area are around 1.5m to 2m long, with a mesh size of 1.5 cm and they generally do not have capture pockets. Though it is occasionally used individually, the cast net -as is typical for covering and lifting devices- is commonly operated in small groups. Three to four cast net fishers may collaborate together throwing their nets at the same time next to each other trying to cover a larger area. Fishing success is higher than by individual cast net operations and fish catch is usually shared equally among the group members. The number of cast nets has been decreasing in the study area and elder people knowing how to weave them are getting scarcer. The reduced number of cast nets has become subject to borrowing procedures according to which the owner receives one fourth to one third of the fish catch and he is in charge of the maintenance of the gear. Usually, due to the weight of the inferior chain, cast nets are operated by men; only in Pu Poanh a young woman is skilled in using it. It is used mainly in the middle of the dry season or when whole schools of fish migrate up-stream.

The ***plunge basket*** is a typical low water fishing gear used most frequently in recession ponds or in rivers in the dry season. Gears used in river are with a diameter of around 40cm is smaller than the common plunge basket used in the rest of the country. A smaller gear is easier to handle in stony riverbeds and transparent water allows for targeting fish more precisely than in the muddy waters of swamps and ponds.

In ponds close to Sre Ampil and in the lower reaches of the Chhlong river basin the plunge basket is reported to be used in communal fishing operations. In these cases, long rows of fishers wade through the shallow ponds and all plunging the basket into the mud at the same time. Fish caught in the ponds are predominantly "meat fish" such as trey róh, trey kranh, spiny eels and trey komplienh.

Traditionally, the ***hand lift*** net was part of the standard fishing out fit of each household. The smaller nets had a size of 1m x 1m with a mesh size of 1cm and the bigger ones were 2m x 2m with a mesh size of 2cm and more. The net fibers used to

weave the net by hand were twisted from raw fibers of the stem of the thmey plant. The opposite corner points of the square net were tightened with two equally long bamboo poles whose intersection was anchored flexibly at a 2-3m long bamboo pole serving as a handle.

The net was operated by sinking the net into the water with one hand and with stick in the other hand trying to scar the fish from their hideouts under vegetation. Once a fish was spotted over the net area the net was lifted with a sudden move. Sometimes, two people went together, one holding the net and the other scaring the fish. This gear was used only in shallow waters (<1 m deep) when the water stops flowing February-May. Fish caught with this net was mostly scaly fish.

The ***scooping basket*** is a special type of lifting device. In contrast to the shovel-shaped "chneang" scooping basket widespread in the rest of the country (Deap et al. 2003: p.16), in the study area a round bamboo wickerwork basket with a diameter of around 40 cm and a maximum depth of approximately 10cm is used to scoop aquatic organisms from the riverbed and in swamps. Usually, the operator shovels underground sediments, sand and gravel, by hand into the basket and with shaking movements the sediment is sieved through at the water surface. Tiny shrimps, small fishes and crabs hiding in the sediments are filtered out. Also they may shovel the sediments on land to search for the catch. The scooping basket is used also to catch fresh bait for hooks. The scooping basket is only used by women and children with boys older than 12 years stopping to use it. Often during rainy season they may take their scooping baskets along to their garden fields in the forest and may use them to provide for animal protein while staying out in the fields.

GRID TRAP

There are only small grid traps, "n'dóh", used by Khmer people in small streams, such as O Ngan, for a short period of time (around 10 days) towards the end of the rainy season during the down migration of the fish. It is used where the river is not more than 2 m wide.

BASKET TRAPS

Several basket traps, made from bamboo slates and fixed with vines, were occasionally used in the past in the study area. One ***horizontal cylinder trap***, called "pa:m", is equipped lateral entry cones. Likewise, ***vertical vase traps***, made of bamboo wickerwork, called "paong" were in use. The outer wall of the latter needed to be covered with buffalo dung before fishing, in order to prevent the termite bait from escaping.

Two types of ***cone traps*** were formerly used in the study area. One trap, called "sró:", was made of a big bamboo pole and the walls of wickerwork. At its wider end an entry cone was inserted. This cone trap was roughly 50-80 cm long. It was operated at the beginning of the rainy season to catch up-migrating fish. When the water currents became too fast its operation needed to be suspended. It caught mostly white fish or scaly fish and also trey andaing, trey chlang, trey changva and trey ksa:n.

Big ***wedge cone traps***, called "brray", could have a length of up to 4-5m long. They were made of bamboo slates and kept in cone shape by vines, leaving large openings for water to flow through and only big fish to be trapped. It was installed on the up-stream side of rapids linked on both sides to small stone walls channeling down-migrating fish into the mouth of the trap. This trap operated with strong water currents and during the second half of the rainy season. The "brray" trap caught trey prolong (Ca wai), trey chhkaok (Ca mae:), trey kchar (Ca korr), trey trosok (Ca 'rrpong). This gear is not used any more because there is no more big fish as there used to be.

Fishing by hand

Catching the fish or other aquatic produce by hand is the simplest fishing techniques, used whenever possible. It is typical for catching of frogs. In Kati and Andong Kroloeng administrative village, people go frog hunting during the first 3 rains of the year using torch light at night time. Catches of up to 20 kg after the first rains are not rare. The frogs are stored alive in sacks at home and consumed gradually. In O Am frog hunting is undertaken more regularly after rains and often constitutes a source of cash income. Small frogs are also used as bait for hook fishing.

Similarly, people catch crabs in the rice fields or at the river banks or gather shells in shallow rivers. In dry season, sometimes people catch fish by hand in the small holes in the dried out riverbed.

PUMPING OF SMALL RECESSION WATER HOLES

At the end of the dry season, small retention basins that are too small to invest labor in harvesting of fish poisons in the forest are bailed out by hand or using sandals or small a "sáh" (a traditional back pack basket sealed off with natural resin). This fishing technique is usually undertaken in small groups of friends or families. Mostly women and children participate in this activity.

FISH ATTRACTING DEVICES (FAD)

In preparation of a fishing operation fishers, sometimes, use devices to attract and concentrate fish. For example, they may use an old tree rotting in the water where certain fish will feed on. Once a day, they may pull it out of the water onto land harvesting the fish hiding inside its holes. Likewise, they may use bundles of branches.

In the deep pool M'ric in O Pórr river an American warplane went down. Today it serves as a FAD. Fish hides in the body of the crashed plane and fishers use to fish with hook and lines next to it.

In the lower Chlong basin fishers use fresh bamboo poles as FADs in deep pools to attract and catch eels, trey kchhoeung. The "bampong" is made of a fresh bamboo pole which is set out onto the rocky underground next to a deep pool securing it with a rope attached to a tree at the riverbank. Trey kchhoeung feeds inside the pole and seeks shelter in it. The fisher leaves the bampong for 3-4 days on the bottom of the pool and then dives for it to take it out. When he brings it up he has to put one hand onto the opening of the pole in order to prevent the eels from escaping. Sometimes two or three trey kchhoeung may hide out in one "bampong". One bamboo tube is only used during one fishing season (dry season). It is never taken out, but it has to be kept under the water permanently. The older it gets the more the eels will like it and hide in it. One fisher may use as much as 30 tubes of bamboo.

ANNEX 4 FISHING WITH NATURAL POISONS

By far, the most important fishing method in Punong villages has been, traditionally, fishing with natural poisons. This method has been critical for providing villagers with a big amount of fish in a short time allowing them to make fish paste, locally called "kaó:m". Fishing with natural poisons is part of the cultural heritage of the Punong. Commonly, the use of this method is locally regularized and requires the consent of the spirits and a well organized larger group of people to cope with the multiple tasks.

The use of natural poisons requires detailed knowledge about selection, preparation and mixing of natural poisons. Bio-chemically, the poison affects the fish in that the fish's capacity to absorb oxygen from the water is being reduced, thus producing a sort of asphyxiation (Degen 1990). Contrary to the associations produced by the term "poison"[75], this method is rather selective, since different species react in different ways to the different natural poisons used in the area.

Table: Natural plants used for fish poisons:

Name[76]	Scientific name[77]	functional part of plant	Remark
Treang	Corypha sp.	fruit	The outside cover of the fruit serves as fish poison and the inside of the fruit and sprouts for thatches, hats, mats and for writing "satras" (khmer religious texts)
Pó:m	?	whole plant	he whole plant is chopped into pieces
Wapó:m	?		Only affects scaly fish
Choe Ploeung	?	bark and wood	The bark and wood of young trees are scraped with a knife then soaked in water. Too long contact with this poison irritates the skin and may peel off
Knhaik	?	whole plant	Considered a strong poison and very effective
Sombó Popé:l	?	bark	
Sophí:	?	bark	
Momeang	?	bark	Momeang is also used as medicine
Leveang só:	?	bark	
Pchek	?	bark	
Reang	Barringtonia spp.	bark	Young leaves are eaten as salads. Bark is also effective medicine against fever, paludism and diarrhea.
Kontrop	?	roots	
Teing	?	roots	
R'teing	?	roots	
Thmor rot	?	vine	
Volán		vine	
Chwá:		vine	Has a lot of thorns
Vonlón		bark of vine	
Vol chvea		bark of vine	
Kandal	?	bark and roots	

[75] The Khmer term "thnám" can mean both, poison and medicine.

[76] These are names of plants recorded from a variety of different informants. It could not be established, at this stage, if some of the names recorded are used for the same plant or if different plants might be reported under the same name.

[77] Dy Phon (2000) reports 16 plants used for fish poisons giving the scientific names for all of them. However, only two of the 20 fish poisons, recorded in this study (above) are listed in Dy Phon 2000. It remains unclear, whether different names are given for the same plant or the same name may refer to different plants in different places.

Environmentally, natural poisons seem to be harmless, since they naturally degrade and lose their effectiveness within 24 hours. Snakeheads and most catfish species, crustaceans and amphibians remain unaffected by the natural substances, as do human beings.

The deep pools

Each village recognizes a number of different individual deep pools they can fish with natural poisons close to their village. Villages in the headwaters, Pu Poanh and Pu Chu only have access to smaller deep pools or will need to travel larger distances to access bigger pools for this activity.

Annex 7 presents a list of 85 deep pools that have been recorded in the study area and the larger river basin : Fish caught in these pools is very diverse depending on the timing and location of the fishing ground. In general, the higher up the deep pools are located in the Chhlong river basin[78] the smaller are the pools and, consequently, the size of the group needed to fish them. In the lower part of the middle reaches and the lower reaches of the Chhlong river basin deep pools are bigger and a larger workforce is required to fish them successfully. Also, as the river does not dry up in the lower reaches and oxbow pools are no common feature there, several interconnected deep pools can be fished using up-stream and down-stream enclosure devices like barrages or stop nets that may or may not include basket traps or grid traps.

Fishing operations with natural poisoning

Within Punong culture, the use of natural poisons has been well regulated and used in a way that allows not only for high fish yields in a short period of time but also for strengthening village cohesion by sharing the fish within the community.

In the study area, natural fish poisons are used exclusively in the dry season in deep pools of the rivers and rarely in recession ponds. The deep pools selected for fish poisoning are at that time disconnected from the river flow and form a species of oxbow ponds. Fish that didn't make it into the deeper waters down-stream is trapped in the closed off deep pools up-stream. Ideally, these deep pools are fished with poisons as soon as they are disconnected from the flowing river water before "natural" fish mortality starts depleting the trapped fish. Different fish species may prey down the food chain within the enclosed water body as well as by water birds, otters, snakes and water lizards frequenting these welcome feeding places.

Rules of conduct for fish poisoning:

- while digging up Knhaik roots people are not allowed to touch anybody's hand or shoulder.
- people cannot speak to anybody from another village
- when you beat up the poison, girls cannot be dressed up (nicely); women cannot dress sexy, are not allowed to wear earrings
- The old people, when they saw the kids playing around, they got upset and hit them strongly. That was the way to keep the poison strong.
- people cannot joke around while beating up the poison, can not flirt among each other (if they would the Chás Srok would beat them)
- girls cannot stand with both hands in the hips (they have to behave serious and sit around like old people, if they do not behave properly the Chás Srok fines them, he may throw the girl into the trap or beat her until it hurts.

[78] This list only reflects the results of research activities in the study area and the short Chhlong basin survey and is believed to be incomplete. However, most important deep pools might be recorded.

A typical fishing operation requies a series of coordinated steps as follows

1	**Monitoring and identification of suitable deep pool**	In dry season water is clear and transparent. The Chas Srok or elders may go and check out the amount of fish in the deep pools in the river, starting withtheir favorite deep pool. Also they will realize if some of the deep pools arealready fished by neighboring villagers.
2	**Decision-making**	Select the pool with most fish in it. Usually, elders discuss within the village their observations and also consult with younger fishers or resin tapers who might have visited different rivers in more distant areas. In any case the final decision reflects a communal judgment regarding the most convenient deep pool to fish. Usually, one village has its preferred deep pools they fish every year. Additionally, drawing on the experience of the elders and experienced fishers the amount of fish poison to be used needs to be established. This depends on the type of natural poisons to be used. Different poisons have different effects on fish and their plants may be more readily available in different years. Some villagers reported that they never mix different poisons together, in other villages this is not conceived as an obstacle. Only, it is more difficult to calculate the exact amount of the poison plants when more than one plant is being used. Finally, a judgment is made about the minimum number of participants. This implies considering the invitation of neighboring villages to participate.In larger fishing operations, as reported from the lower Chlong river basin, the Me Kontreanh of Plás Andong village invited the Chas Sroks of another 9 villages belonging to the same commune. These big operations required a considerable organization and delegation of responsibilities among participating villages.
3	**Information to participants**	Once the decision about the fishing operation with natural poison is made the decision-makers spread the voice in the village. Each household needs to know how many bundles of poison they have to collect before the indicated day of fishing. In case one or more neighboring villages are invited the Chas Srok (or his assistant) informs the other Chas Srok(s) who disseminate(s) the information in their respective village(s). In bigger operations like in Plás Andong the amount of poison was calculated in oxcart loads.
4	**Collection of natural poisons in the forest**	The collection of the required type and amount of natural poison is a highly responsible task. If the fishing operation is organized within one village certain flexibility could be given to the timing of the collection and, if need be, the fishing operation can be postponed. If several villages are involved the collection of the plants has to be accomplished according to schedule since the failure in commitment of one village would jeopardy the whole fishing operation. The collection of natural poisons was organized by groups heading in different directions of the forest. Sometimes, also they formed groups for collecting specific poisons. For example groups for knhaik and other groups for treang poison. In bigger operations groups were formed by oxcart loads, each oxcart comprising 4-5 poison collectors.
5	**Securing deep pool**	Only for the operation of bigger pools, or several interconnected pools in the lower reaches, special groups had to be formed to secure the fishing area with small stone dikes up-stream and bamboo barrages (thnuos) or stopnets down-stream. The barrages usually contained basket traps on the inner wall or grid platforms where the fish would strand up. Stop-nets comprised bagnets. These groups operated at the same time when other groups collect natural poisons.

6	**Spirit ceremony**	In different villages a small spirit ceremony was held before the spreading of the natural poison into the water, mainly in the middle and lower reaches of the river. In some village this was the only spirit ceremony held during the operation, in others this was the first of two ceremonies. The spirit ceremony at this time of the operation had two functions: (1) request permission for fishing and (2) promise the spirit that after a good fish catch people will provide him with fish.
7	**Preparation and application of fish poison**	The preparation of the plants containing fish poison aims at improving the possibility to wash out the relevant substances in the most effective way. Thus, the technique being used depends on the natural product being used. All bark, root and small stems or branches and vine products are cut into small pieces or stripes, fruits are cut into halves and "choe ploeung" wood is shaved over a knife that is fixed between two supporting poles. Once the plant products are prepared, people aggregate around the deep pool in regular distances and pound the pieces of plants on big stones at the edge of, and if possible, inside the water. After beating them up sufficiently the pieces of plants or fruit and leave mass is distributed under strong movements into the water. This activity is undertaken by both, men and (non-pregnant) women at the same time. Once all the poison is spread into the deep pool people have to wait until the first fishes appear "tumbling" around on the water surface. This can take between one and a half to up to two or three hours.
8	**Spirit ceremony**	The first fish to appear on the water surface are small white fish species. When the first bigger fish surfaces it is caught and the Chas Srok or an elder in charge of leading the fishing operation sacrifices this first big fish to the spirit of the pool requesting a big fish catch from him. At the same time this ceremony marks the beginning or the communal fishing in the pool. While the elders pray and drink alcohol all the others can start fishing. This type of spirit ceremony was not found in the headwaters but more in the middle reaches in Snuol district, Kratie.
9	**Collection of fish communally**	As soon as the fish starts surfacing people try to catch the fish with their bare hands, scooping baskets and any kind of bamboo baskets they may bring along for this purpose. In the old days they also used hand liftnets, which are not anymore in use today. Some fish die quicker than others and once they died they will sink down to the bottom of the pool.
10	**Distribution of fish**	The fish caught in this phase belongs to the community. All the fish is gathered in one pile separated into small fish and big fish. Each participant family as well those, that couldn't participate in the operation, do receive an equal share of the catch. Often widows or sick persons or elderly couples that could not participate get their equal share. Small fish is distributed by number of full plates and the big fish by units. Generally, elder women were in charge of distributing the fish evenly among the participants and those socially entitled to it.
11	**Spirit ceremony**	In the headwaters of Chhlong river this spirit ceremony is sometimes the only one to be held. In other occasions it is one of two sacrifices given to the spirits. While the first served to request permission from and/or promise a share of the catch to the spirit, this ceremony is to thank him for allowing him to harvest the fish they finally got. After having distributed the fish evenly to all participants, also the spirit gets its equal share. The Chas Srok, if present, or one of the elders participating in the event leads the ceremony, particularly the praying.

12	**Meal**	During the preceding ceremony, most women are busy with preparing the meal for the whole crowd of people. With the final meal for everybody the fishing operation culminates in a party-like event. Until the 1960s, in the middle reaches of Chhlong river these events reached expressions of parish fair shared by up to nine villages and hundreds of people. Enjoyments such as oxcart races and buffalo races were integral part of it. These parties were the biggest "regional" events celebrated among Punong villages in that area. The yearly ceremony for the village guardian spirit was limited only to one's particular village. After the party part of the people will go back to their village(s).
13	**Open access fishing**	Generally, one person per family hangs on at the deep pool up to one or two days after the communal meal the fishing ground was "declared" open for everybody. As mentioned earlier, different fish species do react in different ways to the asphyxiating substances of the natural plants. Some are affected earlier, others later, some remain virtually unaffected. Some fish may die after hours or even half a day. For this reason the remaining fishers try to collect the gradually surfacing fishes. At night, those fishes that die do sink to the bottom surface and people dive after them on the next morning. This fish, though it is in process of rotting, is claimed to be still suitable for being processed into fish paste. Each individual fisher remains with his catches.
14	**Fish processing**	Fresh fish is pre-processed right on the spot after the communal fishing operation in order to reduce the transport burden on the way back. The main propose of using natural fish poisons is the processing of fish. Within a relatively short period of time people can harvest a sizable amount of fish making the effort of processing "kaóm" worthwhile. From the old days people report fish yields of 20-30 kg per family. Today, if still practiced, one family may go home with 3-5 kg at the most.In the middle reaches, people claim that in the old days they only used a modest dosification of fish poison in order to affect only the small fish to make fish paste. They were not interested in the big fishes since they were caught, preferably, with hooks and were not that suitable for making "kaóm".

Apart from the big communal and inter-communal fishing operations with natural poisons there are in sometimes also smaller groups, of two to four people, who may use natural poisoning in smaller retention basins that are too big to pump out but far too small to organize a mayor communal fishing event. Sometimes, also children may experiment and play fishing with natural poisons in larger puddles in rivers or recession ponds.

ANNEX 5 HABITATION OF IMPORTANT SPIRITS

Village[origin of information]	Name of spirit	Name of River	Name of Waterfall	Deep pool	River stretch	Hill
Pu Poan	N'det	O Kérr		✔		
Pu Poanh	Yo:k N'gwait					✔
Pu Poanh	Brrou	O Kameng	Brrou	✔		
Pu Chu Loeu	Mborr	O Kameng	Mborr	✔		
Pu Chu Loeu	Brráh Ca N'yút	O Chlong			✔	
Andong Kroloeng	Krring	O Pórr	Krring			
Pu Rung	Brráh Plai	O Pórr		✔		
Pu Rung	Brráh L'ho:ng Pórr	O Pórr		✔		
Pu Rung	Chong	O Pórr	Chong	✔		
Pu Rung	N'lang	O Pórr	N'lang	✔		
Pu Rung	Klá	O Pórr	Klá	✔		
Pu Rung	Chú:	O Pórr	Chú:	✔		
Pu Rung	Peam Tra:ng	O Pórr		✔		
Pu Rung	Ping Peam Ngoi	O Pórr		✔		
Pu Rung	Kraeng					✔
Pu Rung	Kung Trek					✔
Kati	Kwai Teng					✔
Daem Beng	Theng Dao	O Tron	Theng Dao			
O Tron	Ta Changva			✔		
Sre Ampil	Keo Seima					✔
Sre Ampil	Cho:p	O Chlong				✔
Sre Ampil	Brráh Bombót					✔
Sre Ampil	Brráh Brei					✔
O Am	Memlo:m					✔
O Am	Krolmahá:					✔
O Am	Sa:t	O Pam		✔		
O Am	Chung	O Pam		✔		
O Am	Mót	O Pam		✔		

ANNEX 6 IMPORTANT WATERFALLS (LENG)

Village	River	Waterfall	Spirit	Fishing	activity	Remark
Pu Poanh	O Kerr	R'tok		Yes	No	
	O Kerr	Chiving				
	O Pel	Pean Pé:n				
	O Ronás	Yerr				20 m high
		Tol	✔			20 m high
		Tok	✔			5 m high
	O Romanh	Romanh	✔			10 m high
Pu Chu	O Pórr	Kláng	✔	✔		This waterfall is also accessed by people from Pu Poanh
	O M'pel	M'pel	✔	✔		3 m high; spirit is called "Bong Bot"
	O Ngeun	Kao	✔			20-30 m high; accessed by people from Pu Poanh and Pu Chu
	O Pórr	Kwang Praeh	✔			40 m high
	O Kameng	Brrou				
	O Ngeun	Wat	✔	✔		Fished with scooping basket
	O Kerr	N'dét	✔			There is a 50m high cavern; it is believed in the deep pool lives s large mammal looking like a bat and drinking human blood.
Pu Rung	O Pórr	Me:t	✔	✔		Has a whirl pool and two down-stream pools like Leng Mahouk
Andong Kroloeung	O Pórr	Krring	✔	✔		
	O Chlong	Kok				5 m high
	O Chlong	Tet				5 m high
	O Chlong	Trik	✔			35 m high
	O Chlong	Pot	✔			45 m high
	O Chlong	M'lok				5 m high
Roka Thmei	O R'tao	Cherr	✔		✔	Strong whirl pool; nobody goes fishing there. There are croco-dilesand a strong spirit
Pu Char	O Pórr	Maho:k	✔	✔		Waterfall, 10 m high, has 2 pools, only one of the can be fished. Both have a spirit. The one with the stronger spiritcannot be fished

Annex 7 Important deep pools in Chhlong river basin

Village[80]	*River*	*Name of Deep Pool*	*Size of Pool (m)*[81]			*Spirit*	*Crocodiles*	*Fished with natural poisons*		*Remark*
			Depth	*Length*	*Width*			*Yes*	*No*	
Pu Poanh	O Ronás	Chichoul	5	4	1.5	✔	✔	✔		At waterfall
		N'toch	5	4	2					At waterfall
	O Kerr	N'det	5	25	16	✔	✔* (before)			Now, there a no crocodiles any more The pool is not fished at all; it has a very strong spirit
	O Romanh		5			✔				At waterfall
Pu Chu	O Kameng	Brrou	1.5	20	15					
Andong Kroloeng										A. Kroloeng village accesses deep pools in O Chlong, O Pórr, O Kameng
Pu Rung	O Porr	Chong				✔				
	O Porr	N'lang				✔				
	O Porr	Klah				✔				
	O Porr	Chuh				✔				
	O Porr	Peam Trang				✔				
	O Porr	M'hok								
	[O Kanong]									There are no pools with spirits
Kati	O Chlong	Wach	?	1000	20	✔				
	O Chlong	Charr	5	30m diameter						
	O Chlong	R'leng	3	35	30					
	O Chlong	Peam Brro	3	25	40					
	O Ngeun[82]	Chrung	3	20	50					
	O Ngeun	Mukang	4	20	30					Difficult to fish because there are a lot of rocks on the bottom surface, very irregular
(Kati)	O Ngeun	Loat	2	20	70					Shallow pool
	O Ngeun	Brah	2	20	40					
	O Ngeun	Chengung	1.5	25	50					
O Am	O Pam	Mót	5-6	8	25	✔	✔	✔		
	O Pam	Tol				✔				
	O Pam	Blúk				✔				

Village	River	Deep Pool	Size of Pool			Spirit	Crocodiles	Fished with natural poisons		Remark
			Depth	Length	Width			Yes	No	
	O Pam	Kae				✔				
	O Pam	Redó				✔				
	O Pam	Chong				✔		✔		
	O Pam	Saat				✔		✔		
	O Am	Traang						✔		O Am is tributary of O Chlong
	O Am	Sóng						✔		
	O Am	Chravángn						✔		
Sre Ampil	O Chlong	Kam Ot	8				✔			
	O Chlong	Chop	3			✔				Has a very strong spirit that can be nasty if you don't respect him
	O Chlong	Tam	2-3	40						
	O Chlong	Cho:						✔		One of the favorite deep pools
	O Chlong	Kayorr	10	200						Very important deep pool. Also people from Srae Khtum fish here
	O Chlong	Peam Kanorr	10				✔			There are a series of smaller pools fished with natural poisons by groups of children or families.
		Peam Kamót	10				✔			
	O Mahoach									
[in Kratie province	Chlong	Rochaechong	Very deep					✔		Fished in the old days among 4 villages (Pu Trom Loeu, Chnaeng, Thnaot and Pu Trom Kraom)
Ksim	Chlong	Treang					✔			
	Pao / O Pórr	Chuo Dei Só:					✔			
	Pao / O Pórr	M'ric	12		100		✔			Crocodiles breed there. American airplane fell into this pool during war.
	Pao / O Pórr	Peam Kao	6-7		>1 km					Located down-stream from Peam O Kao
	Rona:									At O Rona there are also deep pools reported, names not known

Village	*River*	*Deep Pool*	*Size of Pool*			*Spirit*	*Crocodiles*	*Fished with natural poisons*		*Remark*
			Depth	*Length*	*Width*			*Yes*	*No*	
Samrong	Chlong	Mahan Sar	6		70	✔		✔		Up-river
	Chlong	Thmat	7		200	✔		✔		
	Chlong	Pemét Ta Prum	7		100	✔		✔		
	Chlong	Sapring	8		100	✔		✔		
Bridge over Preik Chlong, road between Snuol to Kratie										
	Chlong	Peakdao	6		100	✔		✔		
	Chlong	Taháem	6		1000	✔		✔		
	Chlong	Treang	12		100	✔		✔		
	Chlong	Chumnús Srok	6		60	✔		✔		
	Chlong	Ktao	9		80	✔		✔		Down-river
	Chlong	Veng	12		1500	✔		✔		this pool is boundary between Samrong and Svay Chreach district. There is an airplane that fell during the American war into it.
Rumpok	Chlong	Trolop				✔	✔			
	Chlong	Takaul	11			✔	✔			
	Chlong	Peak Hol								
	Chlong	Treang								
	Chlong	Sandán								
	Chlong	Srae Po:n					✔			
	Chlong	Tuok				✔	✔			
	Chlong	Apót				✔				
	Chlong	Levean						✔		have one spirit together, when poisoning, thus people only make one spirit ceremony
	Chlong	Kéh	>12		600			✔		
	Chlong	Samrong								
	Chlong	Talauk	8			✔	✔			is round and has a crocodile; has spirits
	Chlong	Kahé	14		30					
	Chlong	Kantuet	7		100					
	Chlong	Poa								
	Chlong	Da rapids	Important landmark, because here people can cross the river. Fished with gillnets for trey changva							
	Chlong	Rung	5		50					
	Chlong	Svay	5		250					
	Chlong	Chhdao	5		50					
	Chlong	Phum	5		300					

Water flowing down-stream

Village	*River*	*Deep Pool*	*Size of Pool*			*Spirit*	*Crocodiles*	*Fished with natural poisons*		*Remark*
			Depth	*Length*	*Width*			*Yes*	*No*	
	Chlong	Trolop	5		200					
	Chlong	Kanchae	5		400					
	Chlong	Slaeng	3							
	Chlong	Baksao	7		1000					
Srae Char	Chlong	Repeang								
	Chlong	Thmor Kong								
Veal Konsaing	Chlong	Peam Dóh Kuoong	3							Up-stream
	Chlong	Peam Boeung Kaek								
	Chlong	Kamponhg Choeng Ko								
	Chlong	Sambour								These are the pools villagers from Veal Konsaing would be entitled to fish
	Chlong	Ta Pouv								
	Chlong	Mean								
	Chlong	Sdey								
	Chlong	Chuo Knaich								
	Chlong	Preik Toan Tim								
	Chlong	Samrong								
	Chlong	Vil								
	Chlong	Chhmar								
	Chlong	Thmor Krä:								Down-stream
Srae Triek	Chlong	Samrét	6							
	Chlong	Chuor Veng	8							
Kampong Srae	Chlong	Don Daok	25		30					Trey tuok is regularly caught with gillnets.
Boeung Kiep	Chlong	Russei	10							The first deep pool in Chlong river from down-stream

[80] The village name indicates the village where the name of the deep pool was recorded. It does not necessarily mean that the named village has exclusive use rights to the deep pool recorded. It only reflects the knowledge of the informant who provided the information.

ANNEX 8 IMPORTANT PONDS (TRAPEANGS)

Village	PondsTrapeang	Spirit	Yes	No	Remark
Pu Rung	Heav		✔		
	Mbén		✔		
	Ngav Khla:		✔		
	Ngav Mén Dub		✔		
Pu Trum	Kraom Chó:k	✔			Does not dry out in dry season
Daem Beng	Theng Dao		✔		
Sre Ampil	Pil		✔		
	Pach		✔		
	Keung		✔		
	Kruoh		✔		
	Chok	✔			Spirit ceremony
	Thomnah		✔		
	Peouv		✔		
	Veng		✔		
	Da		✔		
	Kamlao		✔		
	Saeng	✔			Spirit ceremony
	Rongko		✔		
	Kranh Hae	✔			Spirit ceremony
	Lapatchak		✔		
	Doich		✔		
	Pealpa		✔		
	Ravdav		✔		
	Dooichmae		✔		
	Choan		✔		
	Yongpung		✔		
	Tumnup Sre Ampil		✔		Water reservoir from Pol Pot times, 1 km long dike; important fishing ground as long as it contains water
O Rona Plauk					
O Am Paé					Around 50 ha surface area
	Damrey				Biggest pond in the O Am area
	Labaké Phalla				In dry season it is a swamp area
	Mariúng				Are connected to each other
	Avreyong				
	Kranh				
Chnaeng	Darr		✔		Does not dry out in dry season
	Séng		✔		Does not dry out in dry season
			✔		Never dries out. During American war a helicopter was shot down here.
Choeung	Choe Daem			✔	

	Pram Bat		✔		
	Alinh		✔		
	Chhmúk		✔		
	Roleang	✔	✔		
Srae Triek	Smaonh Toit	✔			
	Smaonh Thom	✔			
	Chhuar	✔			
	Ryok	✔			
	Balang Toit	✔			
	Balang Thom				Is not fished at all because it is located in midst of the forest; too many stumps and wood
	Kantéh		✔		
	Ting Kambot		✔		
	Roengok		✔		
	Pouch		✔		

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