UNDERSTANDING LIVELIHOODS DEPENDENT ON INLAND FISHERIES IN BANGLADESH AND SOUTHEAST ASIA
(DFID/FMSP Project R8118)

CAMBODIA COUNTRY STATUS REPORT

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Executive Summary

According to the 1998 census, Cambodia population was enumerated as 11.4 million with a rural sector population ratio of 82%.

About 36% of the Cambodian population lives below the poverty line. About 90% of the rural households depend on agriculture as their primary source of income. However, large disparities in poverty distribution exist, with the coastal and mountainous regions having the lowest incidence of poverty (22%), the Tonle Sap Great Lake region having the highest incidences (38%) and the plain region with 29% of the population below the poverty line(UNDP, 1999).

Households headed by someone working in agriculture and fishing manifest the highest incidences of poverty (46%), followed by construction and mining (37%), transport (31%), and government workers (20%) (UNDP,1997). Nearly 75% of poor people are in fishing and farming occupations. Poverty incidences are also higher in households headed by someone with no schooling (47.1%) as compared to households headed by someone with secondary education (30.1%) and for those with college/university degree (0%).

Absolute Poverty in Cambodia is pervasive (UNDP, 1997; UNDP, 1998; MoP, 1998)[1], with about 39% of Cambodians living below the poverty line of about US$ 145 per person per year in 1993-4 reducing to 36.1% in 1997.

Between 1993-4 and 1997 the poverty incidence fell from 37 percent to just under 30 percent in urban areas, excluding Phnom Penh where it remained at 11 percent, and fell slightly in rural areas from 43 to 40 percent. Economic growth was also associated with a significant increase in consumption inequality that suggests a lessening of the poverty reduction impact of an expanding economy. While the poorest 20 percent of the population increased their consumption expenditure per capita by 1.7% between 1993-94 and 1997 the corresponding increase for the richest 20% of the Cambodian population was 17.9% (MoP, 1998).

Cambodia is an agrarian society with approximately 85% of the workforce engaged in forestry, crop, livestock and fisheries. Fisheries contribute some 10% of the sector's total output. The annual freshwater fish catch is in the order of 295,000-420,000 tons, and fisheries contribute 8.8%-10.3% of GDP. According to DOF (2000), the total inland fish production for the whole country ranges from 279,000 to 441,000 tonnes of which 115,000-140,000 tonnes is landed by small-scale fisheries, 45,000-110,000 tonnes from rice field fisheries, 34,000-91,000 tonnes from large scale fisheries and 85,000-100,000 tonnes is landed by middle scale fisheries. In addition, marine fisheries production contributes 36,000 tonnes and aquaculture contributes 15,000 tonnes to the total production.

Fish consumption rates vary around the country. The highest consumption rates are found in or near fishing villages, particularly near the GL and the TS where rates may exceed 80 kg per capita per annum. In southeastern Cambodia annual fish consumption per capita is much lower (13.5 kg). The national average is estimated to be 25-30 kg per capita per year.

[1]The poverty line is defined as an expenditure of US$ 0.48 per capita per day in Phnom Penh, US$ 0.37 in other urban areas (district and provincial towns and cities of Sihanouk ville, Kep, and Pailin), and US$ 0.32 in the rural areas.

A huge migration takes place every year to the Tonle Sap to trade rice for Trey Riel *(Henicorhynchus sp.-a small cyprinid)* and other small fish species to make Prahoc (fish paste), a key component of seasonal food security for poor rice farmers.

The use of electrocution fishing, focusing on snakehead, is widespread throughout the remote wetland region, and is being practiced by all scales of fishing, especially small-scale. This situation is rampant, due to widespread poverty, fish stock decline, inequitable right of access to fishing grounds by small-scale fishers, and the surge in demand for snakehead by the Thai market.

Ecological change, due to water development in the upstream countries, has reduced the flood in the entire Cambodian inland wetland system, resulting in fish habitat loss. Further habitat loss is related to destruction of flooding forest for agricultural expansion.

There is no specific national policies directly relate to management of aquatic resources. The National Program to Rehabilitate and Develop Cambodia (NPRD) sets a cohesive package of objectives for establishing the rule of law, ensuring economic stabilization and implementing structural reforms, strengthening capacity building, fostering rehabilitation and construction of physical infrastructures and facilities, integrating Cambodia's economy into the region and the world, promoting rural development and sound environmental management, and optimizing the use of natural resources.

The Royal Government of Cambodia's (RGC) agricultural development strategy features a two-pronged framework – one that embraces rapid, sustained and equitable agricultural growth as well as empowerment of the poor. The first prong is the growth-mediated approach whose main thrust is to invigorate and modernize the agricultural sector, generate employment, enhance household incomes and improve the access of the less privileged to food. The second prong is the entitlement-mediated approach which empowers farmers, rural poor and other vulnerable groups to enhance their ability to participate in the growth process. It focuses on improving these groups' access to land, water and other production inputs for sustainable livelihood, food security and overall socio-economic development.

Since 1979, the main policy of the Fishery Department has been to sustain landings. To the present, the national fisheries policy is still concerned with managing and conserving the natural aquatic resource in order to supply sufficient food to people.

The fishing concession system remains the primary means by which DOF manages Cambodia's fisheries, but reforms started in October 2000 under the initiative of Prime Minister Hun Sen, are beginning to challenge and reshape this management approach. The key elements of reform include the reduction of concession fishing-lot areas and promotion of community fisheries management through the establishment of community fisheries development office and sub-decree as the legal framework for this management approach. It can be an invaluable tool to improve governance and ensure more equitable and sustainable natural resources allocation by involving communities in the decision-making process. The development of transparent and participatory decision -making can assist conflict resolution, peacefully resolving situations where communities have felt compelled to resort to protests and petition. In early 2001, 56% of fishing lot areas were released to communities, which in conjunction with local authorities will manage, conserve, develop and sustainably use fisheries resources in order to protect rights and benefits of the people. However, a key note of caution for the RGC's policy reform is that there is no guarantee for improved management without legislative structures, funding or training to support the establishment of community fisheries in these areas. They can effectively

become open access areas, leading to confusion over access rights, alleged uncontrolled exploitation and illegal fishing. Concerns have been raised that there has been undue haste to develop community fisheries in order to fill the gap after removal of lot ownership. In the absence of immediate action this could lead to problems due to poor understanding of the concepts, vital information such as maps, fish catch and stock, fishers' needs and environmental considerations, together with a failure to develop and implement effective regulation and structures.

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Livelihood and aquatic resource use interface in Cambodia

1. Introduction

1.1 River Morphology and Hydrology

Cambodia, a small, ethnically homogeneous country (90% Khmer) though containing minorities of Cham, Chinese, Vietnamese and Khmer Loeu, is located in the Indochina peninsula of Southeast Asia between Lat. 10^0 N. and Long. 120^0 E. Its land area accounts for 176,165.2 Km^2 (97.31 %), and water area is 4,869.84 Km^2 (2.69%) (Thuok & Sina, 1997). The central and eastern parts of the country are rich in inland water systems. The Cambodian section of the Mekong River is 500 Km long and flows into 4 main branches, namely the Great Lake (GL), the Tonle Sap River (TS), the Lower Cambodian Mekong River and the Bassac River. The four rivers meet at Chaktomuk , or "Quarter Bras". During the flood season, the Lower Mekong receives most of the Mekong's flow (62-68%), the remainder being shared almost equally between the TS (11-23%) and the Bassac (12-14%)(CNMC, 2000). During the wet season (May-October) the Great Lake inundates a vast area (900,000-1,400,000 ha) of forest and floodplain (rice fields) which is connected to the Mekong River by the Tonle Sap River. The Cambodian section of the Mekong River has 6 tributaries most of which are small rivers and streams. Six streams flow into the the TS which divides to form 32 estuaries. Two streams flow into the Bassac River.

Figure 1.1 Cambodia water system (source: http://www.asiatravel.com/cambmap.htm)

1.2 Socio-economic Profile

1.2.1 General socio-economic profile

In 1995 the population in Cambodia was only 10.5 million with an annual growth rate of around 2%. The population sharply increased to 11,437,656 from 1997 to 1998 with an annual growth rate of 4.6% (Table 1.1), while at the current population growth rate it will rise to around 14 million by 2005.

Table 1.1: Population by year in Cambodia.

Year	Population (person)	Annual growth rate (%)
1995	10,500,000	1.90
1996	10,700,000	2.19
1997	10,934,334	4.60
1998	11,437,656	2.4
2001	12,300,000	2.3

Source: Department of Planning and Statistics, Ministry of Planning, 1995-98

In 1998 there were 2,188,663 households with the average size of about 5.2 persons. Of the 11,437,656 population about 84.3 % are in the rural areas and are heavily dependent on natural resources for their well-being. The sex ratio is not ideal balance. The female ratio is more than 51 % in both rural and urban area. This is probably due to the civil war with a higher mortality of men than women.

The total area of Cambodia is 181,035 Km^2, which includes the area of the Great Lake. The density of population in the country as a whole is 64 per Km^2, but varies considerably from region to region. Tonle Sap region is 52 per Km2; Mekong delta is 183; Coastal region is 49; Plateau and Mountain region is 17.

Cambodia is emerging from more than 30 years of civil war and turmoil which has left the population, desperately poor. Indeed Cambodia is one of the poorest countries in the region and has some of the worst human development indicators in the world. For example, in 1999 the UN Human Development Index ranked Cambodia 153 out of 175 countries - the lowest in South East Asia - while the UN's poverty index ranked Cambodia 73rd of 78 developing countries.

The average per capita income in 2002 was $286 per annum. Almost 40% of households were below the poverty line, and about one-third of Cambodians did not have enough to eat. Most of the poor (90%) live outside the cities in rural areas, where they have an average income of less than one-third that of urban incomes. Additionally 82% of rural households had no toilet, 96% cooked with firewood, and less than 1% had access to electricity.
Cambodia also does poorly on other social indicators. For example**,** half the children under five are malnourished, for every 1000 live births, 115 children die before they reach five years old, and average life expectancy is 54 years. 42% of the population are under the age of 15. Twice as many women as men over 15 years of age have never attended school (DFID 2000).In general, male literacy rates are higher than those for females, while males have more chance to go to school than women. Literacy rates are higher in urban than rural areas. A majority of the population aged 25 years and over have not completed the primary level education: 70.5% for the rural population and 39.5% for the urban population. Only a tiny number have gone beyond secondary level - 0.2 % for the rural and 2.9 % for the urban. Females in general have a higher percentage than males in primary level education, but when it comes to secondary level the percentage of males is high than for females. This reflects the Cambodian culture that parents do not want daughters to continue their education higher.

The number of economically active persons in Cambodia is 5,117,879 of which 2,641,579 or 51.6% are females. The participation rate is higher for males, while the unemployment rate is higher for females. The participation rate is higher in rural than in urban areas. This is due to lesser participation in agriculture and higher proportion of school attendance in urban areas. The highest monthly average income per head is in the financial sector (378,800 R); whilst the lowest average monthly income per head is in agriculture and fishing (104,600 R)[2].

While there are poor urban dwellers, Cambodia's poverty is overwhelmingly rural. Recent economic growth has benefited those living in the cities far more than those living in the countryside. For example, GDP growth in 2000 was 5% for the second year running due to strong performances in textile exports and tourism. However, poverty remained constant from 1997-99. Over the last five years the consumption of the richest population quintile increased ten times faster than the poorest quintile. Income poverty is estimated to have fallen by about 4% during the last five years, but anecdotal evidence suggests life is getting harder for many. Rural dwellers depend heavily on their land for survival, but rice yields are among the lowest in the region and most households do not produce enough to eat. Meanwhile, access to common pool resources such as fisheries and forests in order to make up the food deficit is by no means secure and the trends suggest that access is diminishing. Policies and legislation work against the interests of the poor, who are further marginalised by rent-seeking at all levels (DFID 2001). About one-third of Cambodians do not have enough to eat, while high population growth is increasing the number of mouths to feed (DFID 2000).
DFID's Country Strategy Paper (2000), using the Sustainable Livelihoods Framework as a tool for structuring a review of secondary information,, gives a general picture of the vulnerabilities that most Cambodians face and the various assets on which they call in making a living and in coping with crises. The Paper notes that 'Most of the rural population lead precarious lives, even those not under the "poverty line". One of the characteristics of their poverty is vulnerability to shocks, of which there are many.' In particular the Paper notes that rural households are vulnerable to farm failure, health shocks and chronic illness, and to rural crime and insecurity. In five of the last nine years harvest levels have been dramatically affected by drought and floods, while in general the death of an animal, crop failure,or human illness can plunge a family into debt and further into poverty. 45% of people borrow money for health emergencies. High rural crime rates increase insecurity, threaten livelihoods and increase transaction costs enormously.

As regards assets, the Paper notes that 'Most families own land but do not produce enough to survive. The difference is made up by fishing and foraging. Many households, both rich and poor, depend on *prei* (forests/wildland) for basic household goods, foodstuff, and grazing land.' However, access to all natural resources is under growing pressure.

As regards land, the Paper suggests that overall land availability is reasonable, but that land pressure is more acute in more fertile areas, while there indications that landlessness is growing. Additionally rights to agricultural land are undermined by weak legislation and ineffective enforcement, so that many people face the risk of expropriation through force. The Paper suggests that increased investment in land productivity would make a big difference in increasing the rural poor's wealth and assets. However, the weakness of property rights (as well as lack of access to better inputs) has led many farmers to keep their investment in land very low and also perhaps to resort to slash-and-burn farming techniques. Certainly 'Growth has not been "agriculture-led" in Cambodia – one striking statistic is that, while Gross Domestic Product (GDP) grew at about 6% on average between 1990 and 1995, rice production was stagnant at 0.1%' (DFID: 2000).

As regards common pool resources (forest, fisheries), which most rural poor exploit as expenditure-saving stategies, the Paper notes that many forests have been logged illegally and

[2]Current exchange US$ 1= 3,900 Riels

are seriously degraded. This, and the allocation of concessions without full consultation with local communities, is limiting poor people's access to an important source of food, materials and income, while it has cost the Government millions of dollars' worth of lost tax revenue. As regard aquatic resources these have been similarly exploited. The Paper suggests that unsustainable fishing is taking place in many areas and that fish stocks are decreasing rapidly, while Tonle Sap, which supplies 40% of the country's fish protein, is being depleted rapidly. The Paper also suggests that the government must be careful that sustainable community use of common resources is not undermined by any attempt to prevent illegal logging or fishing ot to establish robust private property rights.

Such is the dependence of the rural poor on natural resources and the subsistence nature of their livelihood strategies, that there is little for them to fall back on if things go wrong (such as crop failure). Rural households rarely have many cash savings, while there are few formal options for obtaining credit. Most frequently rural people meet their medium-term need for finance by borrowing against their next rice harvest. According to UNDP (1999) .'40% of rural households engaged in small-scale rice farming activities are using the harvest to pay back loans.' When faced with an urgent need, people try to borrow from relatives or neighbours, but when that is not possible they borrow from money-lenders at high interest rates.

However, while family, neighbours and community (i.e. social capital) can be a major buffer against shocks, some studies suggest that these have been weakened by the recent history of upheaval, deprivation, and imposed collective organisation. Nevertheless, the Paper suggests that, although local organisations may be weaker than elsewhere, communities do still work together, and local networks have strengthened in a period of stability.

Nor can the individual or household look to their own human capital for salvation. As noted above, Cambodia performs extremely poorly in terms of the UNDP's HDIs. The provision of safe drinking water, medical staff and health clinics in rural areas is poor, while most medicines have to be purchased in the local market. Yet the poorest quarter of the population spend on average 28% of their income on healthcare which may be inappropriate and ineffective. As noted above, Cambodia performs poorly as regards the proportion of children completing even primary education. While there is educational provision, three-quarters of the cost of primary education is met by households and communities. Education is too expensive for many families, girls and older children especially working rather than going to school or being withdrawn from school when the family falls into debt. The situation is exacerbated by the fact that opportunities for off-farm employment in rural areas is extremely limited.

Finally, while the inadequacy of service infrastructure (health, education, water, and electricity supply) have already been mentioned, it should also be noted much of the rural road infrastructure of Cambodia has been destroyed through three decades of open conflict and neglect. An indication of the importance of rural infrastructure to poor people is the high priority it is given through local planning processes developed under the Seila programme (DFID 2001). Despite considerable donor assistance the road network - and capacity to undertake basic maintenance - is very limited. This restricts rural economic growth – particularly by denying farmers access to sources of input supplies, local urban markets and wider market information.

In terms of governance structures, DFID (2000) notes that macroeconomic management has generally been good since the elections of 1993. Cambodia's overall economic policy has been to promote an open liberal economy integrated into the world trade system, and the economic reform programme has liberalised the economy substantially. Certainly the government seems committed to a pro-poor growth policy, and has reoriented its spending priorities away from defence and security towards the social sector– notably education, health, agriculture and rural development. Such policies should if implemented effectively, start to make a difference to the livelihoods of the poor (DFID: 2000).

However. DFID (2001) also suggests that the government's effectiveness is hampered by lack of capacity and by the web of vested individual and group interests that share power and wealth. The public services are weak at all levels, while corruption in government and the civil service is also perceived as high. Social sector expenditure is increasing, but widespread failure to disburse, skills shortages, institutional blockages and corruption at all levels mean that very little reaches service users.

As a result of these constraints in the implementation structure:

> 'the rural poor have barely any contact with government…It is the lack of implementation capacity, rather than an adverse or disempowering influence of government policies, that characterises Cambodia. This is partly because of such low government expenditure – revenue collection is only 9% of GDP, total public investment is only 3.4% of GDP, and government expenditure on health for example is only US$1 per person per year (six times lower than the developing country average)' (DFID 2000).

Rural people's lack of contact with government structures also has to do with the fact that local government has little to do with commune authorities (the lowest level of government). Meanwhile rural farmers pay no formal 'tax' on what they produce, because most is for household consumption. They have even less to do with politically appointed provincial authorities, who have little capacity and ability to take decisions.

However, a multi-donor funded project (Seila) is working with government to address the above constraints to linkages between governmental structures and communes. Seila's contribution should be directly felt at the national level, in terms of policies and regulations, and at province and commune levels, through more capable and accountable institutions. Most importantly, Seila will directly alleviate rural poverty at village and household level, both in the short term, by providing much needed capital for investments in public services and infrastructure, and in the long term, through sustainable systems (institutions, procedures) for improved local governance and development (DFID, NARSIS database 2002).

1.2.2 Socioeconomic profile in the fishing commune

1.2.2.1 Households Profile

Household heads and Average family size

Household head refers to those who lead the family by taking the position of making the majority of decisions in the family. A socioeconomic survey done by the project for the management of the freshwater capture fisheries of Cambodia revealed that 19% of households in the fishing commune are headed by women, while national statistics indicate that 26% of households in the whole nation are headed by women. The average family size of the fishing dependent commune according to Ahmed *et al* (1998) is about 6. This is similar to the nationwide average family size of about 5.7.

Many socioeconomic surveys have shown the majority of the population in the fishing commune belong to the age group of dependency which is aged 0-13. Although they could help the family in economic activities, these can only be very light and minor tasks. As mentioned by Ahmed *et al* (1998) there are only a few working family members who have to provide education and other basic needs for the family.

Educational Level

The educational status of the population in the fishing dependent commune in the 8-selected fishing provinces is given in table 1.2 below. The percentage of females with no education is higher than the percentage of males. At primary level, there is a higher percentage of female household members than males, but the proportions are reversed when it comes to secondary and higher level of education, the proportion are reversed. This is similar to statistics in the National census (1998).

Table 1.2: Educational status of household members (7 years and above) in 8 selected provinces of Cambodia, 1995-96.

Educational Level	Male (No)	(%)	Female (No)	(%)	All (No)	(%)
No education	1,659	19.6	3,211	26.4	4,870	23.6
Primary	4,917	58	7,455	61.3	12,372	59.9
Secondary	1,559	18.4	1,338	11.0	2,897	14.0
Higher secondary	308	3.6	150	1.2	458	2.2
Bachelor and above	41	0.5	13	0.1	54	0.3
Total	8,484	100.0	12,167	100.0	20,651	100.0

Source : Ahmed *et al*. 1998.

1.2.2.2 Occupation and Income

Ahmed *et al* (1998) reported that households in the fishing commune are involved in a variety of occupations (Table 1.3). Taking account of the responses of all HH members, farming activities (76.71%) predominated over fishing (38%), although the households are in the fishing dependent commune. In fact household income in the fishing dependent commune is derived from various economic activities such as agriculture, non-agriculture activities, and also from business and remittances. Agricultural income is mainly derived from rice production, vegetable, livestock and poultry raising, and aquaculture.

Non-fishing households obtain an average annual gross income per household of about 7,261,000 Riel, which is much higher than that for fishing households at about 4,557,000 Riel. Income obtained from agriculture is 18.77%, and only 6.37% is obtained from common property resources including fisheries. However, this figure does not reflect the real benefit to the household, because this is just the cash income that the household reported. In fact non-cash benefits such as vegetables, firewood, animal, and fish collected from the common property resource did not count in this figure.

Table 1.3: Percentage involvement in various production and income generating activities, 1995-96.

Occupation/Livelihood strategies	% responses of household heads	% responses of household members	% responses of all household members
Fishing	35.88	24.60	38.79
Fish selling	4.24	12.16	13.15
Fish culture	2.50	2.31	2.91
Fish processing	1.60	8.74	9.01
Fishing gear making	0.43	0.38	0.86
Farming	75.96	73.38	76.71
Daily labor	17.31	11.45	20.71
House keeping	14.36	74.13	76.67
Cloth handicraft	2.44	3.50	3.87
Petty trading/shop keeping	17.12	21.07	23.47
Business	3.36	1.97	3.99
Government service	6.92	3.69	8.99
Ciclo/rowing boat service	0.20	0.14	0.27
Moto taxi/boat driving	3.07	0.88	3.40
Private/NGO service	0.38	0.27	0.55
Money lending	0.16	0.14	0.25
Others (firewood collection)	12.04	5.18	12.92

Source: Ahmed *et al*. 1998

A case study about landlessness and aquatic resource use in fishing dependent commune in Battambang province conducted by Oxfam (2000) provides good information about the income of fishing households who work full time in fishing activity. The study focuses on three types of fishing households: land-based households with animals, land-based households without animals, and landless households (Table 1.4). The average income of the fishing household from fishing per day ranged from US$2.2 to 5.7 depending on the fishing season. In general, landless fishing households fish 25 days a month, while fishing families with land fish 15 days a month.

Table 1.4: Average income deriving from fishing and vegetable collecting of fishing dependent communes in Battombong province, 1999-2000.

Fishing								
Items	Land-based with animal		Land-based without animal		Land-less		All	
	Good time	Worse time	Good time	Worse time	Good time	Worse time	Good time	Worse time
Average catch/day kg.)	10.1	4.1	12.3	4.7	9.7	2.8	11	3.8
Average income/day ($)	5.5	2.0	6.6	2.8	4.8	1.8	5.7	2.2
Vegetable collection								
Items	Land-based with animal		Land-based without animal		Land-less		All	
Average income/day ($)	0.8		1.1		1		0.97	
Maximum ($)	1.1		2.3		1.5		2.3	
Minimum ($)	0.52		0.2		0.7		0.2	

Source: Oxfam, case study in fishing commune, Battambang province, 2000

1.3 Poverty line

About 36% of the Cambodian population lives below the poverty line. About 90% of rural households depend on agriculture as their primary source of income. However, large regional disparities in poverty distribution exist, with the coastal and mountainous regions having the lowest incidence of poverty (22%), the Tonle Sap Great Lake region having the highest incidence (38%), and the plain region with 29% of the population below the poverty line (UNDP, 1999). Poverty is manifested and simultaneously caused by low income, consumption and expenditure, a dearth of physical assets, landlessness, poor health and disability, high rate of morbidity and mortality, low levels of education and physical isolation among others.

Households headed by someone working in agriculture and fishing manifest the highest incidence of poverty (46%), followed by construction and mining (37%), transport (31%), and government workers (20%) (UNDP,1997). Nearly 75% of poor people are in fishing and farming occupations. Poverty incidences are also higher in households headed by someone with no schooling (47.1%) as compared to households headed by someone with secondary education (30.1%) and those with a college/university degree (0 %).

1.3.1 Food poverty line

The international benchmark adopted for setting the food poverty line is a 2,100-calorie minimum energy requirement per person per day. In practice calorie requirements vary by age, weight, and the activity of the individual. E.g. Subsistence farmer (2,780), Male engaged in heavy work (3,490), Rural women (2,235), 10-year old boy (2,080), 10-year old girl (1,915) WHO (1985).

A food poverty line of Riel 1,185 per day for Phnom Penh, Riel 995 per day for other urban areas and Riel 881 (Prescott and Pradhan, 1997), per day for rural areas represent the minimum income required per person to reach a daily calorie consumption of 2,100. (The UNDP (1997) estimated the average daily calorie supply per capita for Cambodia as a whole is 2021.) The food poverty lines and underlying breakdown by broad food categories are shown in Table 1.5. More

than two-third (69%) of the calories are obtained from cereals, especially rice. Meat consumption (which includes fish) is the largest expenditure category in all regions.

Table 1.5: Composition of food poverty line by food group

Food group	Phnom Pehn	Other urban	Rural area	
	1184.9	995.3	881.4	2100
Beverage	51.3	37.1	31.2	122.3
Cereal	289.0	247.3	246.8	1440.2
Daily products	7.6	2.7	5.7	1.5
Eggs	20.6	20.8	20.7	7.8
Fruit	104.5	78.2	62.5	55.6
Meat*	433.7	368.3	311.7	202.8
Oils and fat	13.1	12.8	12.5	50.3
Other food products	54.4	35.4	26.2	55.7
Vegetable	118.3	108.5	83.1	42.2
Sugar, salt, species and seasoning	92.3	84.2	81.0	121.5

Source: Prescott and Pradhan, 1997 (In Riels per person per day; US$ 1= Riel 2,500 exchange rate in 1997)
* This include fish

1.3.2 Non-food allowance

Regression analysis is used to identify the typical value of non-food expenditures of households capable of reaching the food poverty line. This method yields different shares of the non-food allowances in the poverty line for each region. This is necessary because price differences between regions of non-food items may be different from price differences of food items. Using this approach, the estimated non-food allowance is Riel 393 per day in Phnom Penh, 296 in Other Urban areas and 236 in rural areas (Prescott and Pradhan, 1997).

1.3.3 Poverty line

The poverty lines are obtained by adding the non-food allowance and the food poverty line for each region. The resulting overall poverty lines for Cambodia in 1993-94 are Riel 1,578 (US$ 1= Riel 2,500) per person per day in Phnom Penh, Riel 1,264 for Other Urban areas and Riel 1,117 for the rural areas.

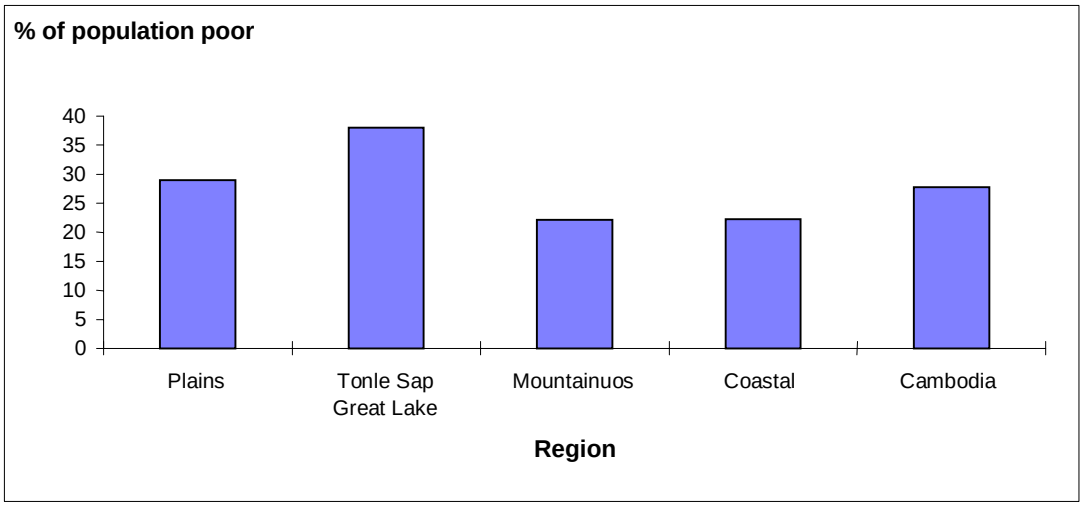
Absolute Poverty in Cambodia is pervasive (UNDP, 1997; UNDP, 1998; MoP, 1998)[3], with about 39% of Cambodians living below the poverty line of about US$ 145 per person per year in 1993-4 (Table 1.6) reducing to 36.1% in 1997. Most had incomes that were just below the poverty line. The *headcount* (incidence of poverty) is lowest in Phnom Penh (11.1%), followed by urban areas outside Phnom Penh (29.9%), with rural areas having the highest (40.1%) (Table1.6). In addition, the *poverty gap* (depth of poverty), which measures the shortfall between the expenditure of poor households and the poverty line, is relatively small in Cambodia (9.2% in 1993/94, declining to 8.7% in 1997) (Table 1.6 & 1.7). The *poverty severity index* (severity of poverty) was estimated at 3.1% in 1993/94 and 1997 for all of Cambodia, though with large regional variations (Table 1.6 & 1.7). (Indeed, if perfect targeting were possible, an annual income transfer of only about US$ 18 per person per month- or US$ 190 million for the country as a whole - would be required to lift the population above the poverty line. This constitutes approximately 40% of overseas development

[3]The poverty line is defined as an expenditure of US$ 0.48 per capita per day in Phnom Penh, US$ 0.37 in other urban areas (district and provincial towns and cities of Sihanouk ville, Kep, and Pailin), and US$ 0.32 in the rural areas.

assistance received in 1995).Since about 90% of the poor in Cambodia live in rural areas, and the incident of poverty is greatest among farmers, poverty alleviation strategies tend to focus on the agricultural sector.

The survey evidence available suggests that consumption inequality in the rural areas may have increased between 1993-94 and 1996, with the richest 20% of individuals experiencing an increase in their relative share of national consumption at the expense of the poorest 80%. This trend, which is typical of that found in many transitional economies, probably occurs because liberalization creates new income generation opportunities that the better off are better able to exploit. Nevertheless, such inequality (which replicates that between urban and rural areas, is regarded as reducing the potential for growth in GDP to lift more people out of poverty

There are large regional disparities in the incidence of poverty, with the coastal and mountainous regions having the lowest incidence of poverty (about 22%) and the Tonle Sap Great Lake region having the highest incidence (38%) (Figure 1.2). The Plains region falls in between with 29% of population below the poverty line (UNDP, 1999).



Source: CSES (1997) and UNDP, 1999.

Figure 1.2: Incidence of poverty, by region, Cambodia, 1997

Although the poorest 20% of the population reduced their share of total food consumption, they significantly increased their ownership of such consumer durables as radios, television sets, bicycles and motorcycles. However, despite three strong years of economic growth, the poverty rates for the country declined only modestly. The proportion of the population whose per capita consumption expenditure was below the poverty line fell significantly in the urban areas outside Phnom Penh, modestly in the rural areas, but not at all in Phnom Penh.

Table 1.6: Poverty indices by region, Cambodia, 1993/94 (percent)

Stratum	Population share	Headcount index	Poverty gap index	Poverty severity index
Phnom Penh	10.7	11.4	3.1	1.2
Other urban areas	11.0	36.6	9.6	3.6
Rural Areas	78.2	43.1	10.0	3.3
Total*	100	39.0	9.2	3.1

Source: NIS 1998 and Prescott and Pradhan (1997). * “Total” refers to sampled regions only.

Table 1.7: Poverty measures by region, Cambodia, 1997

	Population (Million)	Population Share (%)	Headcount index (%)	Poverty gap index (%)	Poverty severity index (%)
Food poverty line					
Phnom Penh	0.9	8.5	3.4	0.5	0.1
Other urban areas	1.1	10.5	15.4	3.3	1.1
Rural Areas	8.4	81.0	20.0	3.9	1.2
Total	10.4	100.00	17.9	3.5	1.1
Poverty line					
Phnom Penh	0.9	8.5	11.1	2.2	0.6
Other urban areas	1.1	10.5	29.9	7.5	2.7
Rural Areas	8.4	81.0	40.1	9.7	3.4
Total	10.4	100.00	36.1	8.7	3.1

Source: NIS 1998; MoP/UNDP/SIDA/World Bank 1999

2. Geographic Distribution of Aquatic Resources Use in Cambodia

2.1 Geography and Aquatic Resources Base in Cambodia

The Mekong River creates a vast inland water system, comprising numerous rivers and lakes, flooded forest, grassland, rice fields and swamps (Table 2.1). This water system supports a number of freshwater fish species and also other aquatic resources. The area flooded around Phnom Penh and down to the Vietnamese border is about 7,000 km^2.

Tonle Sap system consists of the Great Lake, the Tonle Sap River, the Bassac River and its tributaries. In the dry season, the Great Lake occupies an area of 3,000 km^2 (100 km long and 32 km wide) with an average of water depth around 0.8 -1m. During the rainy season, it expands to more than 10,000 km^2 covering the flooded forest which creates an enormous fish breeding, nursing, and feeding ground with depth varying from 10-12 m. Around 280 fish species utilize the inundated forest for at least 6 months for breeding and feeding during the monsoon (Thouk and Sina, 1997).

The flow in the Tonle Sap River changes twice a year. In the rainy season, water flows back towards the Great Lake and vice versa during the dry season. During the monsoon, discharge rates in the Mekong River run at a flood discharge rate of 40,000 m^3/s at Phnom Penh. It floods extensive adjacent floodplains for 4-7 months. The floodwaters reverse the flow of the Tonle Sap River (about 120 km in length), which then has a maximum inflow rate of 1.8 m/s and enters the Great Lake, the largest natural lake in Southeast Asia. When the floods subside, water begins to flow out of the Great Lake, reaching a maximum outflow rate of 2.0 m/s. In-flowing waters from the Mekong River can raise the water level in the Great Lake by an average of 7 m, and it's surface area from 3,000 km^2 to 10,000 km^2, and exceptionally to 13,000 km^2. The Great Lake therefore acts as a natural flood retention basin. By the end of the dry season, a 20-30 km wide band of previously inundated forest is left dry. This forest, which is of great significance for the fishery, is shrinking due to deforestation.

Table 2.1.Areas of various types of land and water resources which support Cambodia's freshwater capture fisheries

Type of land and water resources	**Areas (ha) 1985 - 1987**	**Areas (ha) 1992 – 1993**
Permanent water (River, lake, ponds etc.)	567,100	411,100
Flooded forests	795,400	370,700
Flooded secondary forests	28,200	259,800
Flooded grassland	80,800	84,900
Receding and floating rice fields	17,500	29,300
Seasonally flooded crop fields	366,800	529,900
Swamp	12,200	1,400
Total	**1,868,000**	**1,687,100**[4]

Source: - Cambodia Land Cover Atlas 1985/87-1992/93, 1994.

Inland fisheries occupy two major ecosystems: the Tonle Sap region (accounting for approximately 60% of annual commercial fisheries production), and the Mekong-Bassac inundated region. The Tonle Sap provinces are: Kampong Thom, Siem Reap, Banteay Meanchey, Battambang, Pursat, Kampong Chhnang and part of Kandal to the north of Phnom Penh. The Mekong-Bassac inundated region covers the provinces of Kandal to the south of Phnom Penh, Kampong Cham, Svay Rieng, Prey Veng and Takeo. Of these, Svay Rieng is the only province where no fisheries access restrictions and taxation exists. The three provinces of Siem Reap, Kampong Chhnang and Kandal account for 50% of the total inland commercial catch.

The upper part of the Mekong and the rapids region of Cambodia covering Kratie and Stung Treng provinces, is considered less important for inland commercial fisheries, but serves as an important ecological link between the Great lake and Mekong River for most of the migratory species and provides subsistence fishing opportunities to the nearby residents. The Department of Fisheries (DoF) considers all the above-mentioned provinces (including Phnom Penh) as important for commercial inland fisheries production and reports

Table 2.2.Distribution of inland capture fisheries production, by province

	Fish production (tonnes)				
Province	1980	1985	1990	1995	2001
Plains region (Mekong-Bassac)					
1. Phnom Penh	2,000	5,740	4,600	5,935	9,000
2. Kandal	1,500	10,375	12,500	13,570	21,500
3. Kampong Cham	3,700	4,280	5,100	6,850	10,000
4. Prey Veng	1,000	2,138	2,230	3,105	5,000
5. Takeo	600	1,447	1,900	1,760	5,000
Tonle Sap Great Lake reion					
6. Kampong Thom					
7. Siem Reap	2500	2470	4100	4100	9,000
8. Banteay Meanchey	2000	8450	9000	8000	15,000
9. Battambang	-	-	190	192	3,000
10. Pursat	1300	3700	4300	4712	15,000
11. Kampong Chhnang	2500	5410	7200	7848	15,000
Upper Mekong region	3700	10220	12000	14417	21,500
12. Stung Treng					
13. Kratie	-	670	680	515	2,500

[4] This change is due to conversion to receding rice field, field crop and flooded secondary forest

Total	300	1500	1300	1496	2,500
Total including marine	18,400	56,400	65,100	72,500	134,000*
	19,600	67,578	105,000	103,000	444,500

Source: DoF (2002): Department of Fisheries, Fisheries Data Collection and Statistics 1980-2002.
* Include small-scale fishing

2.2 The Important Role of Fisheries to Cambodia National Economic Development

Cambodia is primarily an agrarian society with approximately 85% of the workforce engaged in forestry, agriculture, livestock and fisheries. Fisheries contribute some ten% of the sector's total output. Van Zalinge and Nao Thuok (1999) and Ahmed *et al*., (1998), estimate that annual freshwater fish catch is in the order of 295,000-420,000 tons, and fisheries contributes 8.8-10.3% of GDP. According to DOF (2000), the total inland fish production for the whole country ranges from 279,000 to 441,000 tonnes of which 115,000-140,000 tonnes is landed by small-scale fisheries, 45,000-110,000 tonnes from rice field fisheries, 34,000-91,000 tonnes from large scale fisheries and 85,000-100,000 tonnes is landed by middle scale fisheries. In addition, marine fisheries production contributes 36,000 tonnes and aquaculture contributes 15,000 tonnes to total production (Table 2.3).

Table 2.3: Fish catch by different scale of fisheries

	Department of Fisheries Data Collection (2000)	**MRC - Management of Freshwater Capture Fisheries in Cambodia Project (1999)**
Large-scale	34,000-91,000 tonnes	Fishing lots 30,000 - 60,000 tonnes Bagnet lots 15,000 - 20,000 tonnes
Middle-scale	85,000-100,000 tonnes	85,000-100,000 tonnes
Small-scale	115,000-140,000 tonnes	115,000-140,000 tonnes
Rice Field	45,000-110,000 tonnes	50,000-100,000 tonnes
Total	279,000-441,000 tonnes	295,000-420,000 tonnes

Source: Department of fisheries data collection (2000) and Van Zalinge, *et al* (1999)

The contribution of fishery products to GDP is Riel 572.52 billion. Fisheries contribute some 7.21% of total GDP (Ministry of Economic and Finance, 1999), However, according to a recent estimation from Ministry of Planning and Statistics, fishery products contribute up to 16% of GDP.

2.3 The Important Role of Fisheries to Rural Livelihoods of Cambodia

2.3.1 The importance of aquatic resources

Cambodia is a country of forests, rivers and rice fields. Rice farming, fishing and extracting forest products (both timber and non-timber) have been the major means of generating food, materials, energy and additional income for subsistence since time immemorial.

A number of authors have commented that the role of aquatic resources (mainly fish), in supporting rural livelihoods has been underestimated or over-looked (Gum, 2000). Gregory (1997), Gregory and Guttman (1999) raised awareness of the importance of rice field ecosystems to the livelihoods of rural people that depend upon harvesting aquatic resources such as fish, shrimps, frogs, crabs and snails from them. Oxfam (2000) reported that the main livelihood activities in a study area in Battambang province are rice and other crop farming, and fishing. Aquatic resources, therefore, not only provide a source of food but also importantly, a source of cash. Utilization of aquatic resources was an important livelihood activity for all families in the study area and for the landless, and represents the main source of income whenever crop production fails, which is a common phenomenon (Ahmed *et al*. 1998; Ovesen et al., 1996).

The flooded forest also plays an important role in household food production and income systems. Despite encroachment and destructive practices, Cambodia still has nearly 700,000 ha of flooded forest habitat. This is exploited for food, trade and other products and provides charcoal, firewood, land for agriculture, materials for constructing shelters and fishing gear, food and medicine. Flooded forest wildlife includes crocodiles, snakes, turtles, frogs and waterfowl.

2.3.2 Fish consumption

Fish consumption rates vary around the country. The highest consumption rates are found in or near fishing villages, particularly near the GL and the TS where rates may exceed 80 kg per capita per annum). In southeastern Cambodia, annual fish consumption per capita is much lower (13.5 kg). The national average is estimated to be 25-30 kg per capita per year. Studies on freshwater fish consumption described by Ahmed *et al*.,(1998) reveal that fish is eaten in three main forms:

- *Fresh fish*: 43.5 kg per capita per year of fresh fish, is consumed by fishing households who live in or around fishing districts and 39.9 kg per capita per year for non-fishing households.
- *Processed fish*: 14 kg per capita per year of fish paste, fermented fish, salt dried fish, dried fish and smoked-fish are consumed by the average household. Based on available conversion rates, this is equivalent to nearly 27.5 kg of fresh fish.
- *Fish sauce*: Fish sauce consumption per capita ranged from as low as 3 litres/year for non-fishing households in Siem Reap to as high as 10 litres/year for fishing households in Kampong Chhnang. The fresh weight equivalent for average annual consumption rates is approximately 4.5 kg.

Table 2.4: Distribution of per capita fish consumption, by region, Cambodia

Region	Per capita fish consumption (kg/capita/year)	Author
Cambodia	20-30	DoF, 2000;
Cambodia	23-31	So Nam and Nao Thuok, 1999
Great Lake (only Siem Reap)	32	
Great Lake (6 provinces)	71	Hy, 1995
Tonle Sap Great Lake (8 provinces)	86.8 71	FAO/PNRM, 1995 DoF/FCFMC, 1995
Tonle Sap Great Lake(including Kandal and Phnom Penh)	25	Ahmed et al., 1998
Southeastern (Svay Rieng)	21.5-39.5	
Southeastern (Svay Rieng)	38	Tana, 1993
Southwestern (Kompot)	40	Gregory, 1997
South (Kandal and Takeo)		APHEDA, 1997 CIAP, unpublished

2.3.3 Dependence of people on fisheries resources

There are 14 fishing provinces in Cambodia with a total human population of more than 9 million. Of these, about 35% are living in fishing dependent communes. The communes whose population have access to water bodies and engage in fishing and fishing related activities are shown in Table 2.5.

The Tonle Sap and its floodplain alone are home to an estimated 1.2 million people of whom 25% live in floating villages or raised houses with little or no access to farmland (FACT, 2002). Thouk and Sina (1997) estimated that 88% of people in 170 villages in and around the flooded forest rely on fishing or fishing related activities. In Stung Treng 90% of households reported a strong reliance on fishing.

The total percentage of households engaged in family-scale fishing in the study provinces was 39%, amounting to 174,379 households out of 452,714 households living in the fishing districts of eight provinces around the Tonle Sap, Great Lake and Mekong/Bassac regions. Ahmed *et al.*, (1998 and 1996) noted that family fishers have limited access to good fishing grounds, which prompts them to violate fishing in reserve lots and go beyond fishing lot boundaries in order to obtain a bigger catch for their fishing efforts.

Table 2.5: Fishing dependent communes and their population, 1998

Name of Fishing Province	Total Population (person)	Total Population in fishing commune (person)	%
Phnom Penh	999,804	226,686	22.67
Kandal	1,075,125	807,705	75.13
Kg. Chhnang	417,693	237,893	56.95
Pursat	360,445	199,370	55.31
Battambang	793,129	270,451	34.10
Banteay Meanchey	577,772	38,779	6.71
Siem Reap	696,164	224,240	32.21
Kampong Thom	569,060	202,773	35.63
Takeo	790,168	193,669	24.51
Prey Veng	946,042	208,081	21.99
Kg. Cham	1,608,914	594,942	36.98
Kratie	263,175	98,541	37.44
Stueng Treng	81,074	15,935	19.65
Svay Riang	478,252	60,315	12.61
Total	9,656,817	3,379,380	34.99

Source: Ahmed *et al* (1998)

3. Historical Management of Fisheries

The management of fisheries in Cambodia began when a French colonialist arrived in Cambodia in 1864 and seized power by signing two treaties with King Norodom (1864 and 1884). French advisers to the King suggested the potential of the Tonle Sap for fee collection of fishing right. Commercial Chinese and Vietnamese fishers began to establish themselves around the lake.

In the 1870s and 1880s the King introduced collection of fees for fishing rights, a share of which went to the French. In 1889-98 the French took over and collected payment directly. In 1898 the first fishing restrictions on seasonal fishing right was introduced. In 1900 the first formal auction of fishing lots was introduced. In the 1920s new fishing gears were invented leading to over-fishing which in turn resulted in restrictions on some fishing gears.

Over the succeeding decades, the fishing lot system remained largely intact until the advent of Pol Pot's regime (1975-79). Fishing activity was quite limited during that period. Only a few designated fishing units harvested and processed fish. For the most part, fisheries resources were neglected in favour of agricultural development that involved extensive clearing of flooded forest and wetlands (Degen *et al*. 2000).

After the overthrow of the Pol Pot regime in 1979, collective fishing[5] was introduced until the late 1980s. During this period, Cambodia's fisheries were managed through a system of solidarity group called " Krom Samaki". In practice, fisheries access was open to all in many places and the fishing system collectives were ignored, except for the state-specified quotas of fish products for civil servants and military (Chheng, 2000 and Degen *et al*. 2000).

A fishing concession was re-introduced in the late 1980s for commercial fishing lots both as a management tool and source of government revenue. In 1987 Fiat law No 33 which defines fisheries resources and the framework for their management was adopted and the lot system was re-introduced accompanied by various proclamations and two sub-laws covering permitted fishing

[5] worked and fished collectively in the form of commercial scale but with simple and non-destructive fishing gear. The state provided money to purchase fishing equipment and other operation cost materials. Then, they divided the fish catches equally amongst the members

gears, lot allocation, demarcation and management, fish sanctuaries and management of inundated forest.

4. Policies and institutions

4.1 Macro policies

There are no specific national policies directly relate to the management of aquatic resources. The existing overall strategies of the RGC have been articulated in the following strategic statements: The National Program to Rehabilitate and Develop Cambodia (NPRD-1994); the Five-Year Socio-Economic Development Plan; the Triangle Strategy; the Royal Government Platform for the Second Term 1998-2003; and the Policy Framework Paper (PFP). These are briefly reviewed below.

The National Program to Rehabilitate and Develop Cambodia

The National Program to Rehabilitate and Develop Cambodia (NPRD) sets a cohesive package of objectives for establishing the rule of law, ensuring economic stability and implementing structural reforms, strengthening capacity building, fostering rehabilitation and construction of physical infrastructures and facilities, integrating Cambodia's economy into the region and the world, promoting rural development and sound environmental management, and optimizing the use of natural resources.

Review of the First Social-Economic Development Plan for 1996-2000

A number of socio-economic targets are referenced in the First Socio-economic Development Plan 1996-2000 (SEDPI). Given the distribution of the population and of poverty in particular, the SEDPI emphasized rural development and also stressed the need to strike a balance between this goal and that of assisting the urban poor and the development of major urban growth poles. On the assumption that investments in rural locations are more likely to have pro-poor benefits than investments in urban areas, the SEDPI target allocation for public investment expenditures was for 65% to go to projects in rural areas and 35% to urban areas. During the implementation it turned out to be the opposite: 65% of investment expenditures going to projects in urban areas, whereas only 35% of expenditures went to projects in rural areas. Overall, the targets set for the SEDPI were ambitious. Moreover, public investments were not allocated as planned, leading to a slow reduction in poverty levels and an increase in income inequality.

Policy Framework Paper

The Government's economic reform is geared to ensuring macroeconomic stability, strengthening the banking and financial system, undertaking fiscal reform measures, establishing a sound management of public property and increasing public investment in the area of physical and social infrastructure, promoting private sector development, and developing human resources. The government's economic objectives are centered on poverty alleviation and sustainable economic growth and are clearly stated in the Policy Framework Paper (PFP) prepared in October 1999.

The key elements of the strategy are: strengthening revenue collections and enhancing the transparency of fiscal operations, combined with reforms of the civil service and military; increasing public investment with a view to rehabilitating the country's poor social and physical infrastructure, and shifting spending priorities to health, education, agriculture and rural development; and strengthening legal frameworks and economic institutions.

4.2 Agriculture policy

The RCG's agricultural development strategy features a two-pronged framework – one that embraces rapid, sustained and equitable agricultural growth as well as empowerment of the poor. The first prong is the growth-mediated approach whose main thrust is to invigorate and modernize the agricultural sector, generate employment, enhance household incomes and improve the access of the less privileged to food. Modernization, in the context of Cambodian agriculture, means a small-holder and dynamic agriculture (making use of appropriate technological innovations) where farmers have control over their production environment. Among others, the growth-mediated approach calls for the maintenance of a consistent macroeconomic and agricultural policy framework that promotes an environment conducive to increased private sector participation in agricultural development and encourages public and private sector investment in essential infrastructure, provision of public goods and human resource development. Such a strategy seeks to promote rapid and sustainable increase in productivity through the adoption of suitable, productive and cost-effective technologies such as small-scale, farmers-controlled, private irrigation facilities and crop diversification. The second prong is the entitlement-mediated approach which empowers farmers, rural poor and other vulnerable groups to enhance their ability to participate in the growth process. It focuses on improving these groups' access to land, water and other production inputs for sustainable livelihood, food security and overall socio-economic development.

Given the goals of poverty alleviation, food security, environment-friendly, sustainable growth, global competitiveness and the principle of equitable development, the strategic framework for agricultural development centers on the following components:

1. Maintenance of an appropriate macroeconomic framework and a favorable policy and institutional environment.
2. Development of an export market for rice and other agricultural products along with processing and product quality control facilities.
3. Strengthening of essential agricultural support services and functions including extension, research and development, marketing, credit and input distribution.
4. Improved management and the introduction of appropriate technologies for rice-fish farming and aquaculture.
5. Strengthening the capacities at all levels of the Ministry of Agriculture, Forestry and Fisheries.

4.3 Fishery Management Policy

Since 1979, the main policy of the Fishery Department has been to sustain the catch from the fisheriesTo the present, the national fisheries policy is still concerned with managing and conserving the natural aquatic resource in order to supply sufficient food to people. The First Socio-Economic Development Plan is designed:

- To improve fishery products to supply sufficient foodstuff for home consumption and promote exports to contribute to the national budget; and
- To manage, conserve, protect and develop sustainably the fisheries resources.

The fishing concession system remains the primary means by which DOF manages Cambodia's fisheries, but reforms started in October 2000 under the initiative of Prime Minister Hun Sen are beginning to challenge and reshape this management approach. The key elements of reform include the reduction of concession fishing lot areas and promotion of community fisheries management through the establishment of a community fisheries development office and a sub-decree as the legal framework for this management approach. It can be an invaluable tool to improve governance and ensure more equitable and sustainable natural resources allocation by

involving communities in the decision-making process. The development of transparent and participatory decision -making can assist conflict resolution, resolving situations where communities have felt compelled to resort to protests and petition.

In early 2001, 56% of fishing lot areas were released to communities, which in conjunction with local authorities will manage, conserve, develop and sustainably use fisheries resources in order to protect rights and benefits of the people. However, a key note of caution for the RGC's policy reform is that there is no guarantee for improved management without legislative structures, funding or training to support the establishment of community fisheries in these areas. They can effectively become open access areas, leading to confusion over access rights, alleged uncontrolled exploitation and illegal fishing. Concerns have been raised that there has been undue haste to develop community fisheries in order to fill the gap after removal of lot ownership. In the absence of immediate action this could lead to problems due to poor understanding of the concepts, vital information such as maps, fish catch and stock, fishers' needs and environmental considerations, together with a failure to develop and implement effective regulation and support structures. The current draft sub-decree on community fisheries not only calls upon fisher communities to undertake a role in the management and enforcement of designated fishing areas; it also restricts their activities to family-scale fishing. (In the sub-decree the definition of family-scale fishing is issued by proclamation of Ministry of Agriculture Forestry and Fisheries, and review of this proclamation is going on).

Thus areas that have previously been fished using large-scale commercial gear will now be fished entirely with small-scale gear which fishers have argued are insufficient to meet their needs (even with the greater resource access). Central policy reforms towards transparency and co-management are welcomed, but the real challenge comes in implementing the reforms at local level to ensure a successful transition to a fair and sustainable system of resource exploitation.

The political and historical situation in Cambodia is unique and the challenge to establishing community fisheries, include:

- Ethnic divisions, which are widespread. There is antipathy between Khmers and Vietnamese and Cham minorities, who accuse each other of illegal fishing. The management plans require longer term cultural change in order to resolve these problems.
- Perceptions among some DOF staff and others in the fisheries sector that community fisheries will lead to over-fishing.
- Lack of experience with community fisheries in Cambodia.
- Potential for the transaction costs of negotiating and enforcing community fisheries to outweigh the benefits.
- Perceptions that establishing community fisheries will simply provide a means for local authorities to expropriate fishing rights and sell them.

4.4 Fishery legal framework

The law focuses on improvement and conservation of the fishery, protection and conservation of fishery resources, improvement of fishery exploitation through suitable technology, encouragement of family fisheries, improvement of fishery products exportation, improvement of data collection and development of aquaculture.

Cambodia's fisheries legislation, Fiat-Law on Fishery Management and Administration, was issued by the Council of State on 9 March 1987. Together with its two sub-laws (made by the Council of Ministry in 1988) and regulations (made by proclamation or circular principally by the

Ministry of Agriculture and also by the Ministry of Justice), the regulation is extensive and detailed.

The regulation under the Fiat-Law (1987) classifies and addresses gear use (such as small-scale fishing gears, middle-scale fishing gears and large-scale fishing gears) and restrictions, demarcation of inland fishing lots and fish sanctuaries, limits of the forest belonging to the inland and marine fisheries, issuance of fishing permits, fish processing, violations, fishing record, export of fish, collection and distribution of fish, fishery inspection, and research. The proclamation of several other regulations, including one relating to marine shrimp culture and another concerning fish exports are reportedly under consideration.

Environmental and ecological issues are poorly reflected in existing legislation which does not cover the management of the protected flood area, development of the marine fishery domain and jurisdiction. Although the fisheries legislation is comprehensive and geared primarily towards resource conservation and control and enforcement, it is probably not well understood by most fishers and perhaps not even by some fisheries officials. The poor enforcement of the country's fisheries legislation is a major constraint in achieving long–term sustainable resource use. However, legislative revision alone will not automatically lead to improved enforcement. This will require a package of supporting measures designed to implement and administer the legislation within the administration.

According to current Fisheries Fiat Law, the inland capture fishery is divided into 3 categories:

- **Large-scale fishing lots** are operated under two-year concession gained via public auction. The auction grants private lot owners exclusive right over a particular fishing ground or anchor position for large-scale fishing gear. The lot owners are also responsible for protecting the natural habitat within the lot boundaries, (law enforcement is the competence of DoF).

  In reality lots are often sub-leased both as a mean to recoup the money paid and because lots are too large to be fished effectively by one operator. The relative short-term length of tenure may mean that lot owners feel that they have no long-term security which in turn may prove detrimental to ensuring sustainable fish catches since there is little incentive to fish them in a sustainable manner. Each lot has a “burden book” which contains the specific details of the management program, marketing, time of the open and closed fishing seasons, the boundaries and other spatial arrangements governing access to fishing areas for the lot owner and local communities, as well as definitions of allowable type, number and location of fishing operations. The burden book also specifies the method for the payment of the concession fees. Local communities often remain unaware of the burden book and its stipulations. Such a lack of transparency has contributed to conflict.

  The large floodplain fishing lots often have villages located within or in close proximity to them which are often demarcated as “area set aside for the people”. Nevertheless, access to these areas is often at the behest of the lot owner. Along with the illegal extension of boundaries - which is common - this has proved to be a source of conflict.

- **Middle-scale fisheries** originally operated under a system of licensing. Fishing is characterized by the use of larger-scale fishing gear than those of family fishers, but smaller-scale than commercial fishing lot operations. However, as there were no set limits to the number of licenses that were issued the system could not be considered as a tool to manage the resources. In early 2001, the taxes were removed in recognition of

the needs of family-scale fishers who could not meet their subsistence need with small-scale gear alone.

- **Small-scale family fisheries** are defined by the type of fishing gear allowable. These fishers are allowed to fish anywhere at anytime, except within fishing lots, during open season and in the protected areas. This scale of fisheries is intended for "subsistence" but this term is open to interpretation as to whether it refers only to fishing for food or fishing to derive a small income from the sale of the catch.

The Department of Fisheries (DOF), under the Ministry of Agriculture, Forestry and Fisheries (MAFF) is responsible for the management, protection, conservation and development of fisheries resources). With a staff of more than 1,400 (DOF, 2002) and facilities in each province, DOF is responsible for enforcing regulations, granting concessions and issuing licenses, collecting fees, and controlling processing, trade and export activities.

5. Cross-sectoral impact on inland capture fisheries

5.1 Agriculture

Agricultural chemical run-off may affect nearby fisheries and directly impact rice paddy fish productivity (Thuok and Sina 1997). Due to a lack of research on this subject in Cambodia, it is impossible to determine whether the levels of agricultural chemical run-off have significant impact on the health of fisheries. However, anecdotal evidence suggests that high pesticide use in some areas affects fish productivity in rice paddies and nearby ponds (Gregory 1997, Shams and Try 1998, Gum 2000).

Reliable data on water pollution is very scarce, but local researchers have found that pesticide use in the Tonle Sap catchment is widespread and increasing every year. In 2000 an estimated 1.3 million litres of pesticide were used in the catchment area, including many highly hazardous chemicals (including DDT, methyl parathion and monocrotophos) imported from neighboring countries. It was recently reported that 10 tonnes of DDT and Folidol (methyl parathion) had run-off 2000 hectares of mung bean crops into the Tonle Sap (FACT, 2002).

The impacts of pesticide use on ecological security have yet to be assessed but are potentially acute. Toxic chemicals in high doses can cause acute sickness and death in humans and aquatic organisms. For example, monocrotophos is a cholinesterase inhibitor and disrupts the nervous system causing acute effects including weakness, pain, vomiting and blurred vision. Ingestion of less than 1 tablespoon of liquid can kill an adult. Other chemicals – particularly persistent organic pollutants (POP) – concentrate in the food chain and display longer- term detrimental effects. DDT and DDE (a breakdown product) can cause changes in avian courtship behavior, delays in egg-laying, eggshell thinning and embryo deaths, all of which could have profound implications for the long-term survival of species (WHO, 1989). Fish samples taken from the lower Mekong basin have indicated that pesticide residues are ubiquitous with the highest concentrations in catfish species, one of the most commercially valuable taxa.

The widespread use of fertilizers in the dry season could also affect the ecology of the lake, causing localized temporary eutrophication and even fish kill (UNDP, 2001). Indiscriminate use of agrochemicals is a problem that needs to be tackled before it has deadly impacts both on the human and the wetland environment.

A large proportion of Cambodia's flooded forests and wetlands have already been converted to agricultural land. Flooded forest areas decreased from 937,900 ha in 1973 to about 370,000 ha in 1997. It has been reported that siltation of the Tonle Sap is a serious problem as deforestation in the basin is believed to have caused accelerating soil erosion. However, the lack of reliable long-term data prevents the development of firm conclusions. A planned study forming part of the Mekong River Commission's Water Utilization Program should aim to investigate this further.

In 1995, Cambodia, Lao PDR, Thailand and Vietnam signed an agreement on 'Co-operation for the sustainable development of the Mekong River Basin, and established the Mekong River Commission (MRC) to coordinate and promote sustainable management of water and related resources. This agreement acknowledged the life-sustaining links that transcend the boundaries between the countries of the lower Mekong basin. The future management of Cambodia's fisheries and wetland has to consider these important transnational issues and address them in cooperation with the Mekong countries.

5.2 Trade and Consumption

The rare water-birds of the Tonle Sap are seriously threatened by hunting and egg collection for food. The practice declined when international research institutes and NGOs worked alongside lot owners in 1997 to investigate the water-birds population, but there is clear evidence that it has escalated again recently and is having an impact on the internationally significant populations of storks and pelicans on the Tonle Sap.

Rural communities also harvest large numbers of water snakes in the wet season, including the endemic Tonle Sap Water Snake *(Enhydris longicauda)*.In the Tonle Sap more than 8500 snakes are harvested daily during the peak of the wet season, for human consumption and feeding to captive crocodiles. Stuart *et al* (2000) question whether this exploitation is sustainable and what indirect economic impact this has from increased rodent numbers.

Cambodia's freshwater turtle populations are also exposed to intensive exploitation to supply the Chinese food markets. Local subsistence use and domestic trade of turtles in Cambodia is also widespread, while a legitimate international trade in live reptiles of up to 200 tonnes per year to China and Hong Kong is run by a Government export agency (KAMFIMEX). More significant and damaging is the illegal international trade of Cambodian turtles to China via Vietnam. However, there is considerable uncertainty over the extent of this trade that operates through middlemen in each province who transport the turtles to Phnom Penh and then to Vietnam via river or road.

Many globally threatened species of turtle inhabit Cambodia's inland waters including the Yellow-headed Temple Turtle *(Hieremys annandaii)*, Contors Giant Softshell *(Pelochelys cantorii)* and the South Asian Box Turtle *(Cuora amboinensis)*. Populations of these turtle species in countries throughout the region have declined substantially in recent years and without urgent action the Cambodian populations seem destined to follow suit.

5.3 Infrastructure

Cambodia's inland fisheries are dependant on the maintenance of suitable water flow regimes both within Cambodia and from upstream countries in the Mekong Basin. The high productivity of the Mekong River System relies on the seasonal inundation of forest and floodplains. Since the early 1950s nearly 6,000 large and small dams have been built in the lower Mekong basin, including thirteen generating an output of 10 MW or more of hydropower. The Government of Lao PDR aims to construct 23 dams by 2010 and the People's Republic of China (PRC) reportedly has plans for twelve more power projects on the Mekong main channel, including two large reservoir projects that may have a significant impact on the downstream flow regime.

Furthermore, China is also planning to blast a navigation channel through to Lao PDR- which could have dramatic downstream effects.

Fish productivity in Cambodia is positively correlated with the extent and duration of wet-season flooding. Wet Season flooding is caused primarily by a rise in the Mekong River water level. Changes in catches may simply reflect changes in gear effort and with river flow rates etc rather than changes in fish abundance. (Zalinge et al., 2000).

The recent construction of the Yali Falls Dam in Vietnam just about 70 km from the Cambodian border has had enormous impacts on the livelihoods of an estimated 20,000 downstream villagers, but has created opportunities for those above the Falls. In addition to flooding impacts from dam releases, villagers report a severe decline in fish stock and serious health hazard (Mckenney, 2001).

6. Cross-sectoral impact on livelihoods of the poor

Existing administrative and legal institutions have failed to protect the assets and access rights of the most vulnerable. Unlawful expropriation by more powerful, rich and higher level people's claim to a piece of land and the expelling of lawful occupants by force or by threat of force, is the most dramatic way of restricting poor people's access to their land. Although there is no firm data on exactly how many families have lost their land in this way, human rights case files, newspaper articles, and reports from community development NGOs indicate that the problem is significant. Beyond the problem of the impoverishment of the families who are dispossessed in this way, unlawful expropriation raises serious questions about the effectiveness of land titling procedures and of the 1992 land law itself.

Dams, more than almost any other type of large infrastructure project, affect people's livelihoods. Whilst these structures can improve downstream agricultural productivity through improved and reliable irrigation, they can bring about changes to river flow and interrupt fish migrations that can induce changes in fish communities and diminish production. Families living in the irrigation area may be forced to sell their land due to changes in flooding patterns, lack of capital to exploit the improvements in irrigation, or speculative pressure. Upstream from the dam, the creation of a reservoir may submerge thousands of houses or fields and destroy the income generating activities of farmers or fishers. Unless adequate and appropriate compensation is given, displaced families will join the rank of the poor.

Rural people in Cambodia, especially women, have limited access to education. Knowledge about hygiene and epidemiology is weak. Some types of illness are related to the lifestyle of family members. Women tend to work more in the village, while men tend to work further away from the village in the forests, in fishing or in towns and cities. Therefore the risk of contracting disease is high, especially malaria among males. When a member falls ill, the family often has to borrow money for medical treatment. The money is typically borrowed from business people, money lenders, other villagers and NGOs credit program, often using livestock as collateral. Villagers prefer private health services over public health facilities such as reference hospitals and health centers (Oxfam Research Team, 2000). Reasons for this include the availability of treatments, payment terms, location, and level of expertise. Generally, public health centers are unable to provide adequate treatment for serious illnesses because of lack of funding by the State.

6. Trends

There has been a significant change in fishing technology during the last ten years with almost all fishers now using nylon monofilament gill-nets to replace bamboo frames and other bamboo

materials. Furthermore, the use of small mesh netting to catch smaller and smaller fish has spread throughout the country as larger fish have declined.

Post-harvest handling practices in the Great Lake region have changed from storing fish in pens and cages through the dry season for live distribution, to chilling for year-round distribution to local and export markets. However, the quality of most fish now arriving at the markets is low, due to shortage of expensive crushed ice at the fishing areas.

The use of electrocution fishing, focusing on snakehead, is widespread throughout the remote wetland region, and is being practiced by all scales of fishing, especially small-scale. This situation is rampant, due to widespread poverty, fish stock decline, inequitable right of access to fishing grounds by small-scale fishers, and the surge in snakehead demand by the Thai market.

Ecological change, due to water infrastructural development in the upstream countries, has reduced the flood in the entire Cambodian inland wetland system, resulting in fish habitat loss. Further habitat loss is related to destruction of flooding forest for agricultural expansion.

The harvesting of new species, such as frogs, small shrimp, bivalve molluscs, combined with the harvesting of fry of *Pangasionodon hypophthalmus* catfish and *Channa microlepis* snakehead, is the result of over-fishing and further damages the ecological balance of the fishery.

Although there was critical reform in fisheries policy in regard to resource benefit re-distribution in late 2000—when over 56% of the concession fishing grounds were re-allocated to local communities—the process of strengthening the capacity of the fishing communities in able management of the fishing grounds is proceeding very slowly.

Assessment of available data/ information and gap.

Type of data /Information	Available data	Gaps in data	Status
Land and water resources	Areas of various types of land and water resources	Data by season not available	
Areas of fishing lots and fish sanctuaries	number and areas of fishing lots and fish sanctuaries	Some fishing lots areas are not well defined	poorly demarcated
Fishery domain and open access areas		the areas are not well defined	no demarcation
Fishing gear	Type and number of fishing gear	size of the gears are not specified	data verification has not been done
Fishers	Number of fishers in large-scale fisheries, processing and aquaculture	small-scale fisheries, rice field fisheries and middle -scale are not included	proper method of survey and estimate is lacking
Fish catch and fish production	Fish catch by province	rice field fisheries catch and small-scale fisheries are not included	data base on record book
Personnel in fisheries sector	Degree and number of personnel	skill and experience is not assessed	

	The titles of reports and development project work in the areas include: • **Reports** - Ahmed, M., H. Navy, L. Vuthy & M. Tiongco. (1998). *Socioeconomic Assessment of Freshwater Capture Fisheries in Cambodia: Report on a household survey*. Mekong River Commission/DoF, Phnom Penh, 186 p.; - Gum, W. (2000). *Inland Aquatic Resources and Livelihoods in Cambodia: A guide to the literature, legislation, institutional framework and recommendations*. Oxfam GB, Phnom Penh; - Shams, H. & Ahmed, M. (1996). *Common and Private Property Linkages for Sustainable Livelihood in Low-Land Forest-Fishery-Farming Systems of Northwest Cambodia*. Paper presented at "Voices of the Commons" 6th annual conference of International Association for the study of Common Property (IASCP), California, 5-8 June 1996; - Gum, W. (1998). *Natural Resource Management in the Tonle Sap Biosphere Reserve in Battambang Province*. Consultancy report for the European Commission Support Programme to the Environmental Sector in Cambodia (SPEC). SPEC, Phnom Penh; - Gregory, R. (1997). *Rice Fisheries Handbook*. Cambodia-IRRI-Australia Project, Cambodia. - Guttman, H. (1999). Rice Field Fisheries – A Resource for Cambodia. *Naga, The ICLARM Quarterly*, Vol. 22, No. 2, April-June 1999; - Phounsavath, S. et al. (1999). *Are State-User Relations Conducive to Fisheries Co-management in the Lower Mekong Basin?* MRC/FIU Technical Symposium, Phnom Phnom, 13-14 December, 1999; - Van Zalinge, N., Nao, T., Touch, T. and Deap, L. (2000). "Where There is Water, There is Fish? Cambodian Fisheries Issues in a Mekong River Basin Perspective" in *Common Property in the Mekong: Issues of Sustainability and Subsistence*, (2000). ICLARM, AMRC and Sida; - Degen, P., Van Acker, F., van Zalinge, Nao, T., and Deap, L. (2000). *Taken for Granted: Conflicts over Cambodia's Freshwater Fish Resources*. Contribution to the 8th IASCP Conference, Bloomington, Indiana, 31 May to 4 June 2000; - Kristensen, J. (2001). *Food Security and Development in the Lower Mekong River Basin: A challenge for the Mekong River Commission*. Presented at the Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction, Asian Development, Manila; - Hou, K. and Carson, T. (2001). *Scoping phase of CBNRM in Cambodia*. WWF, Phnom Penh; - Swift, P. (1997). *Developing a Research Framework for the Fishing Lot System in Cambodia*. Two Preliminary Case Studies on Fishing Lots in Takeo and Kompong Chhnang Provinces, Mekong RiverCommission/DoF/ DANIDA Project, Management of the Freshwater Capture Fisheries of Cambodia; - Swift, P. (1999). *Long-term Case Study of the Fishery Setting in Phlong Village, Konpong Chhnang Province*. Initial Information Gathering and Outline of Future Work Program, Report on Fieldwork Conducted from 7 to 16 June 1999; • **Development Projects and Initiatives** **-** Fisheries Action Coalition Team (FACT) and Fisheries Law Working Group (FLWG) includes: Oxfam America, Oxfam GB, Oxfam Australia, Community Aid Abroad

	(CAA) – Stung Treng and Kratie, Cultural and Environmental Protection Association (CEPA) – Stung Treng, WWF – CBNRM Initiative, ACR, Wetland International, NGOs Forum, FAO Siem Reap, Star Cambodia, Cambodia Development Research Institute (CDRI) - FAO Siem Reap – Participatory Natural Resources Management in Tonle Sap Region Project; - MRC Reservoir Project/DoF - MRC Freshwater Capture Fisheries Management Project/DoF; - GTZ – Kompong Thom Province and other Provinces. - LEUCAENA Project in Battambang Province; - Seila/UNDP Programs i.e. Ratanakiri Province; - STREAM (Support to Regional Aquatic Resource Management)

Questions for further research

1. How effective is the fishing lot management system in meeting rural development and poverty alleviation objectives?
2. What are the costs and benefits associated with establishing and managing community fisheries?
3. How to determine type and size of small-scale fishing gear to meet the needs of rural people livelihoods or community fisheries development?
4. What lessons can be drawn from the start-up experiences of community fisheries that might be applied to future efforts?
5. What changes have taken place in former fishing lot areas and what are the implications for rural livelihoods? How effective are community fisheries in managing areas formerly under fishing lot management?
6. How are conflicts over fishing areas currently settled and what can be done to improve conflict resolution mechanisms?
7. Can rural credits play important roles in supporting and improving livelihoods of fishery communities?
8. Can fish market accession and value-added package support the livelihoods of fishing communities?

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