

# Understanding Vulnerabilities of Agricultural Communities to Frequent Disasters and Coping Mechanisms

## A Sample Study of Tsunami Affected Agricultural Villages in Nagapattinam District



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**By**



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## DEDICATION

**This study report is dedicated to the farming community in Nagapattinam District with due acknowledgement for their support and cooperation in the study despite other demands on their time.**

## Abbreviations Used in the Document

Agri.	Agriculture; agricultural
BPL	Below Poverty Line
CBO	Community Based Organisation
DoA	Department of Agriculture
EC	Electrical Conductivity
FGD	Focussed Group Discussion
GP	Gram Panchayat (local government unit at the revenue village level)
h/h	Household
NCRC	NGO Coordination and Resource Centre
NGO	Non-governmental Organisation
Para	Paragraph
PRI	Panchayat Raj Institutions
SC	Scheduled Caste; the lowest social status in the society
SHG	Self Help Groups
ST	Schedule Tribe

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# *Understanding Vulnerabilities of Agricultural Communities to Frequent Disasters and Coping Mechanisms*

## *A Sample Study of Tsunami Affected Agricultural Villages in Nagapattinam District*

### **1. Executive Summary**

The tsunami caused extensive damage in southern regions of India and Andaman and Nicobar islands affecting a total of 2,260 km. of coastline; the worst affected being Nagapattinam District in Tamil Nadu State. Apart from loss of lives, damages in fisheries sector and shelters, a large extent of agricultural land is affected by tsunami. Agricultural lands in five blocks of the district were flooded with saline sea water. There was not only loss of standing crops and land salination, but also sand and silt cast on the top soil and farm ponds, blocked irrigation channels, and silted common ponds. The paddy crop, which was near harvest stage, was fully damaged. Groundnut was just sown, and so the seed was lost. In the district, nearly 8,000 hectares was affected by tsunami.

NCRC has been working very closely with various stakeholders in the rehabilitation of agricultural livelihoods. NCRC has, over this period, studied and identified a number of issues related to agriculture. One among them is the vulnerability of coastal communities to disasters. NCRC realised that coastal agricultural communities repeatedly face problems related to disasters, and tsunami brought these to limelight. NCRC felt relevant to understand these from communities' point of view, and identify areas to prepare communities to face future disasters. The first step in this direction was this study to understand vulnerabilities of coastal agricultural communities to frequent disasters. The study was conducted through a combination of primary and secondary data, along with scientific soil test. 21 habitations were covered through this study.

#### **Main Findings:**

Agriculture is the main livelihood opportunity for a large number of poor and vulnerable households in this coastal district. Results show a decreasing trend in the yield from agricultural land over the years (even during normal years, irrespective of disasters), which is an area of concern. The salinity in the soil and lower fertility of soil seem to be main factors contributing towards this decreasing trend.

There has been an increasing trend in the occurrences of disasters in the past few years. The coastal agricultural communities of Nagapattinam have faced a number of disasters (flood and drought) over a period of time. The most important immediate

impact of these disasters being reduced or total loss of production from the particular season, and reduced productivity of land due to salination (during floods) or lack of irrigation (during droughts).

The effects of disasters are much wider than just loss to physical or tangible assets (such as land). These affect different profiles of communities in different ways. The result of these disasters has reduced food security for families, in some cases even starvation, forced labour work or migration and increased debts. The marginal farmers are the most affected.

The coping mechanisms are limited to only borrowing and taking up labour. Most marginal farmers end up doing labour work or starve due to loss of livelihoods. This trend has been continuing over a long time thereby not allowing these communities to move out of this vicious poverty cycle. There are no safety nets for these farmers to fall back.

The responses to these disasters from government and other agencies seem to be adhoc, temporary and reactive. There has been very little or no effort to mitigate these disasters or to help communities to prepare themselves to face and manage future disasters. Most times the responses are limited to cash compensation based on land holding pattern.

Tsunami, even though has devastated lives and livelihoods of many, has brought to focus the problems faced by coastal agricultural communities in the district. The communities too are interested to work on these issues to mitigate themselves from future disasters, with support from government and other agencies. It is the right time to evolve and implement effective strategies involving communities and other facilitating agencies to mitigate future disasters and ensure sustainable farm based livelihoods of the vulnerable coastal agricultural communities.

#### **Some Pointers for Moving Forward:**

The study has shown that when there were facilitative support (year 2005-06) in terms of technical, social and financial through government and other agencies, the adverse effect of these disasters have been reduced to a large extent. The study indicates that the support to communities to mitigate and manage these disasters should be multi-pronged. Any one type of solution is not likely to yield sustainable results. Two broad areas of support have emerged – Disaster Preparedness and Responses to Disasters.

##### *Disaster Preparedness:*

- Vulnerability mapping (technical and socio-economic) of the agricultural habitations, lands and communities;

- Building capacities of the farmers in the areas of cropping patterns, soil and crop management, package of practices, etc
- Developing mechanisms that can ensure easy access to resources, particularly for the marginal farmers, who are most vulnerable
- Developing security nets such as savings, credit during emergencies and for inputs, and insurance through group approaches and linkages with existing institutions
- Strengthening farmers based organizations (self help groups or other forms of community based organizations) to undertake the above mentioned tasks through a community based approach.
- At the district level, there needs to be a central mechanism that ensures periodical review of these activities at various levels and geographical areas, identify gaps and facilitate learning and negotiating platforms to improve the disaster preparedness strategies. The district level monitoring and support mechanism needs to be integrated with national disaster management institutions so that the field level processes and understanding is used as the basis for policies and decision making at the highest levels.

*Responses to Disasters:*

- Need to develop systems that can ascertain compensation packages that are scientific and going beyond tangible and physical losses. There is a great need to work on hardcore data to arrive at these. It is also important to have community consultations and involvement at various levels to ensure that the packages/ norms etc are appropriate and effective to local situations.
- Developing broad disaster-specific guidelines for reclamation in disaster situation at national level which should be a mix of indigenous and scientific knowledge arrived on a community participatory basis.
- Establishing institutional mechanism at the district level that ensures coordination of inputs during disaster situation.

Each of the above areas could be supported by a variety of institutions such as government departments, banks and financial institutions and facilitating agencies such as NGOs. The approach needs to be community-based with communities empowered to assess, plan, execute and maintain structures and systems to mitigate and manage future disasters.

## 2. Background and Objectives of the Study

### 4.3 Tsunami and its Impact in Nagapattinam District

The tsunami caused extensive damage in southern regions of India and Andaman and Nicobar islands affecting a total of 2,260 km. of coastline or more than one-fourth of the coastline of the country. Waves reported to be as high as 3-10 mts and penetrated from 300 mts to 3 kms., inland. Worst affected regions are in Tamil Nadu and Andaman & Nicobar Islands. Estimates put the death toll at 10,740 most from Tamil Nadu. Over 1.6 million families were affected in the state.

All 13 coastal districts of Tamil Nadu were affected, but the worst losses were recorded in Nagapattinam where 6,065 people killed. The fisheries sector in Tamil Nadu suffered major damage in terms of lives, boats, gear and to the infrastructure such as harbours and fish landing centres. An estimated 85% people affected by tsunami are from fishing community.

#### The extent of destruction

All 13 coastal districts affected

10,740 killed

1.6 million families affected

5 blocks flooded with sea water

Of the 11 blocks in Nagapattinam, agricultural lands in Sirkali, Tharangambadi, Nagapattinam, Keelaiyur and Vedaranyam blocks were flooded with seawater. The damage was most in villages south of Nagapattinam, less in the north. In the North of Nagapattinam, there was only saline water flooding fields, but the damage was most in

villages south of Nagapattinam. There was not only loss of standing crops and land salination, but also sand and silt cast on the top soil and farm ponds ranging from a few inches to 2 feet depth. Irrigation channels were blocked, common ponds damaged/salinated/silted up. Seawater ruined grazing lands, water tanks and wells. Water turned saline and brackish. In 44 of the 73 affected villages, crops were damaged. The paddy crop, which was near harvest stage, was fully damaged. Groundnut was just sown, and so the seed was lost. In the district, nearly 8000 hectares of affected agricultural lands, which include both cultivated as well as fallow, were affected by the Tsunami.

### 4.3 The NGO Coordination and Resource Centre (NCRC):

The NGO Coordination Centre was set up in early January 2005 for coordinating the efforts of approximately 500 NGOs involved in relief



operations in Nagapattinam, a coastal district, devastated by the tsunami. With the tapering off of the relief activities, this NGO Coordination Centre transformed itself into the NGO Coordination and Resource Centre (NCRC) taking on roles that evolved during the relief operations. The centre saw an emerging need for a mechanism to ensure the effectiveness of the different rehabilitation measures proposed in terms of equity and sustainability through ensuring meaningful exchange of communication between the planners and the affected communities, strengthening the sectoral knowledge and expertise and building up of a common vision and perspective.

Four major areas of focus as identified by the NCRC have been - Information Exchange and communication to the various stakeholders, Community Facilitation Support, Sectoral Support, and Advocacy.

NCRC supports communities to liaison with the government to ensure that the strategies for rehabilitation are long-term and sustainable. This is achieved through sector-specific strategies focusing on five sectors – fisheries, agriculture, other livelihoods, shelter and children.

#### **4.3 Role of NCRC in Agricultural Sector:**

The impact of Tsunami on the agriculture livelihood of the people in Nagapattinam was severe that reclamation of all tsunami affected agricultural lands irrespective of land ownership was required to be attempted on a priority basis. Several common property resources related to agriculture such as ponds, channels etc were also damaged needing attention. Coordination with implementing NGOs with the active participation of Department of Agriculture and farming community in the process of development is considered important. Evolving a common and comprehensive reclamation package with the NGOs in a participatory manner, validating the package with the Line Departments and Farming Community and facilitation to ensure effective implementation of the package including donor support to the NGOs were undertaken. Policy advocacy with the District Administration, NGOs and donor organizations to further strengthen the implementation process has been taken up. Dissemination of information to the farming community on the package further ensured education to the farmers. The capacity building programme to the NGO field staff and in turn to the farming community further strengthened the whole process.

#### **4.3 Objectives and Scope:**

NCRC has been working very closely with various stakeholders including communities for over a year in the area of agricultural livelihood rehabilitation. NCRC has, over

this period, studied and identified a number of issues related to agriculture. One among them is the vulnerability of coastal communities to disasters. NCRC realised that coastal agricultural communities repeatedly facing problems related to disasters and tsunami brought these to limelight. NCRC felt relevant to understand these from communities' point of view, and identify areas to prepare communities to face future disasters. The first step in this direction was to undertake a systematic study, as grass-root level data on these issues were not readily available for planning.

The main objective of the study is to:

- Map the profile of habitations and communities dependent on agriculture in the tsunami affected area of Nagapattinam District
- Understand the vulnerabilities of coastal agricultural communities to frequent disasters and their current coping mechanisms
- To identify areas for support to coastal agricultural communities of Nagapattinam District to be effectively prepared to face and manage future disasters

### 3. Methodology

The study used a combination of primary data collected from a sample of habitations affected by tsunami, secondary data analysis and outputs of various consultations with the stakeholders in the district. The study covered 15 of the 42 revenue villages affected by tsunami (21 habitations). Of these, six villages are from the northern region of Nagai town and the rest nine from southern region.

The villages for the study were selected through a purposive sampling method with a view to cover different profiles that could possibly determine the vulnerability to disasters. The sample villages were selected to represent all five Taluks. Habitations were the unit of study. In each Taluk, habitations that are 'close to sea', 'away from sea' and 'near river cross' were selected for the study. A total of 34 habitations were studied.

In each habitation, 10% of the farmers were covered through case study method. These 10% were selected in proportion to the total numbers in each of the following segments – dry and wet; and marginal, small and medium/large farmers.

Village profiles and individual case studies of the farmers were the main methods used in the study. Apart from these primary data, published information from the Department of Agriculture was also collected and analysed. Soil samples from these

areas were also collected to cover the tsunami affected lands. Soil samples were tested in government laboratories and results are presented here.

In terms of profile of habitations covered, 16 habitations (47%) were situated >500 meters from the sea, 12 (35%) within 201 to 500 meters and, 6 (18%) within 200 meters

Consultations with other stakeholders such as NGOs working in various tsunami affected habitations, experts, academicians and government staff were undertaken during various occasions. Support in designing the study, analysis and report writing was provided by Catalyst Management Services Pvt. Ltd., Bangalore.

The tools used in the study and the raw data in the form of database are available with NCRC.

## 4. Agricultural Profile of Nagapattinam District – An Overview

### 4.3 Nagapattinam District Background:

The Nagapattinam District was carved out of the earlier composite Thanjavur District in 1991. Tamil and Telugu are the main languages spoken in the district. The marine or coastal land has plain lands except for a few sand dunes and tilts from coastline to the inland area. The Vedaranyam salt swamp, south of Nagapattinam town is the largest swamp in Tamil Nadu, running 7-8 kms. wide and 48 kms. along the coast from Point Calimere. It is one of the richest regions of biodiversity in the country.



This District lies on the shores of the Bay of Bengal between Northern Latitude 10.7906 degrees and 79.8428 Degrees Eastern Longitude. The general geological formation of the district is plain and coastal. The Cauvery and its offshoots are the principal rivers.

The marine land or coastal land has plain lands except for few sand dunes. However there is a general tilt from coastal line to inland area. The most important feature of the district is the Cauvery River spread over with its numerous branches.

### 4.3 Meteorological Information:

*Temperature:* The average maximum temperature for the district (from 1991 to 1996) as a whole is about 32.460 C and the average minimum temperature is 24.750C.

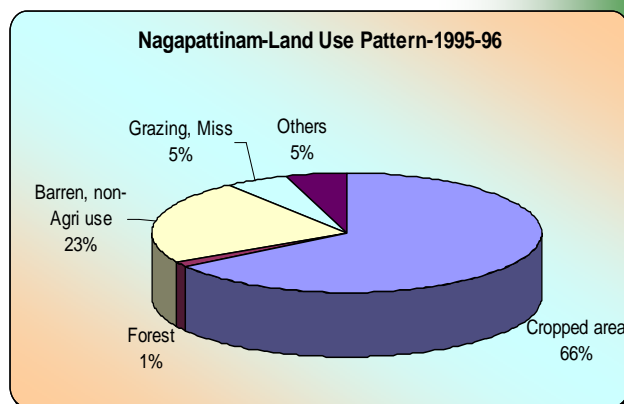
*Rainfall:* The Northeast monsoon, which starts in October and ends in December, contributes about 60% of the total annual rainfall. The Southwest monsoon rains from June to September and from March to May accounts equally for the rest of the annual rainfall. The monthly average rainfall in the district was 108.87 mm in 1991-96.

*Cyclone:* Cyclonic storm brings havoc normally once in 3 or 4 years and heavy downpour during Northeast monsoon leads to flooding of the district and damages field crops and wealth of soil.

### 4.3 Agriculture and Horticulture in the District

The total geographical area of the district was 3536.38 Sq.km. in 1995-96. Cropped area accounts for about 65.53% of the total area. Forest cover is very minimum accounting for only about 1.31% of the land. The non-available for cultivation land covering Barren and Uncultivable land and land put into non-agricultural uses, accounts for 22.83%. The other uncultivated lands including

(a) permanent pastures and other gazing lands, (b) miscellaneous tree crops and groves not in the net area shown and (c) cultivable waste land, cover 5.35

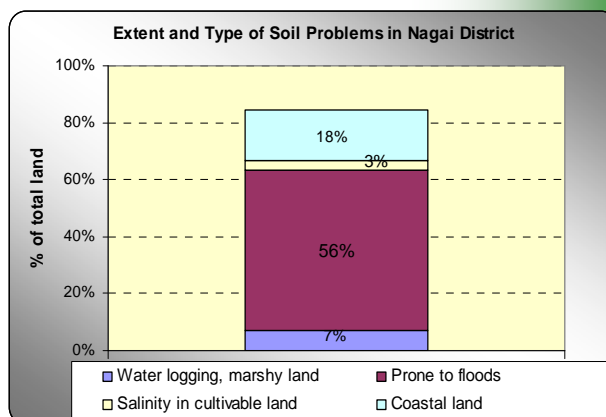


This coastal district abounds in green paddy fields, tall coconut groves, vast gardens of mango and plantain tree and other verdant vegetations. Paddy is the main crop of this district and it is grown three times in a year. The first crop is known as 'Kuruvai' (the short-term crop) with duration of three and a half to four months from June-July to October-November. The second crop called the 'Thaladi' has duration of five to six months from October - November to February-March. Third is the 'Samba' (the long-term) crop and has duration of almost six months from August to January. Other cereal crops of the district are cumbu, ragi, maize, korra and varagu. The pulses grown in the district are redgram, greengram and blackgram. Other food crops are condiments and species, sugar crops, fruits and vegetables. Among the non-food crops, cotton/fibre, edible oils crops (groundnuts, coconut and gingelly) non-edible oils crops (castor, niger seeds, though in very small area) are the important ones.

Fruits and Vegetables were the horticultural crops cultivated in the district in 1996-97 period. Total area of Fruits and Vegetables cultivated in the district are 3143 Ha. Area under plantation crops is 396 Ha. Gardens, nurseries and vegetable forms are available. It is feasible to have vegetable forms for brinjal, tomato, ladies finger, snake guard, bitter guards, beans, cluster beans, etc and nursery like coconut, bamboos, casurina, teak plant.

Based on published data, 88.71% of the soil is sandy coastal alluvium, followed by 6.57% of black soil. According to these sources, the soil in the taluks of Nagapattinam and Thiruthuraipoondi is of poor quality, as soil is saline, arenaceous and drainage is very defective

Chief sources of irrigation in the district are the rivers, a few rainfed tanks and wells. These tanks and wells occur mostly in the upland regions.



## 5. Main Findings of the Study

*This section provides an overview of main findings from the study. Details till the household and habitation level are available for readers to make their own interpretations (available at NCRC). The details given here are deliberately kept brief keeping in mind the readability of the document.*

### 5.1. Profile of Agricultural Communities and Villages:

#### 5.1.1. Profile of Habitations

The study covered 34 habitations, with a population of 15,056 families. In these habitations, close to half of (51%) of the families are dependent on agriculture (farm families). In habitations from Southern Region (south of Nagapattinam Town), this proportion was higher at 68%, compared to the Northern Region – 32%. In about 38% of habitations all families were dependent on agriculture (complete agricultural village).

In terms of type of farmers, about two-thirds (63%) of the farmers in these habitations could be classified as ‘marginal farmers’ and 22% ‘small farmers’. About 15% are either medium or large farmers. In terms of type of housing observed (which is also an indicators of economic status), about 69% of the houses in these habitations are either ‘thatched roofed or government colonies.

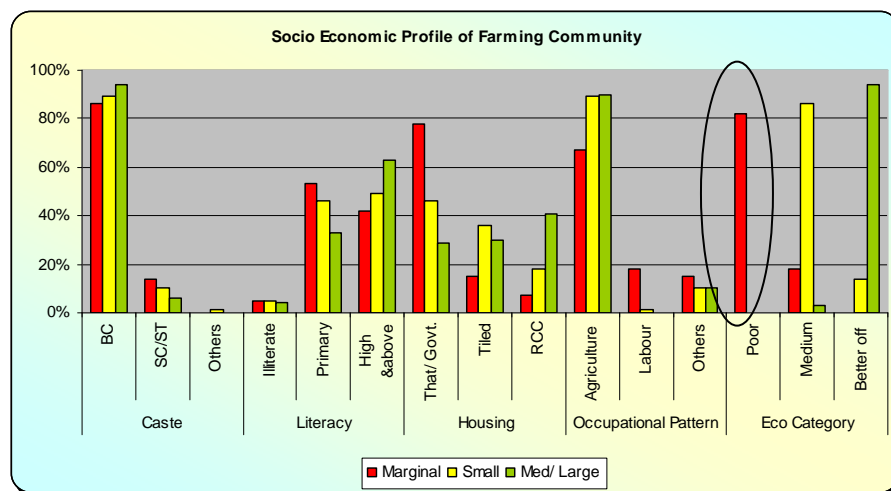
A large number of coastal habitations are dependent on agriculture for their livelihoods; with higher proportion of families in Southern Region. In most habitations, large proportion of farmers have very small land holding, with large proportion of houses being thatched or government colonies, reflecting the poor economic status of most families living in these habitations.

#### 5.1.2. Profile of Households

In the sampled habitations, 72% of farmers are marginal farmers, 19% small farmers and 8% medium/ large farmers. A large proportion of farmers are with very small holdings.

From the sampled households, the socio-economic profile of these farmers is developed, using indicators related to assets, occupation and social status. A little more than four fifth (82%) of the marginal farmers and about 5% of the small farmers could

be classified as 'poor'<sup>1</sup>. In terms of social groups, most of the farmers are from backward class. About one fourth (24%) of the marginal and small farmers are from SC category. Close to 60% of the marginal farmers are either primary educated or illiterates, close to 80% live in thatched houses/ govt. colonies and about 20% dependent on labour.



## 5.2. Farm Practices Followed by Different Profiles of Communities:

### 5.2.1. Type of Land and Soil:

Within the sampled habitations, the extent of agricultural land was about 14,317 acres, of which 70% are dry land. Three habitations (9%) have completely wet land; another 14(41%) with more than 70% in wet land. 50% of habitations did not have wet land. In terms of ownership, 94% of the land is held by villagers. About 11% of land leased out for agriculture, mostly to farmers from other habitations.

The soil type in dry land is mostly (77% habitations) sandy coastal alluvium, followed by sandy loam and clay. In wet lands, sandy loam was very prominent (47% habitations), followed by sandy clay (35%).

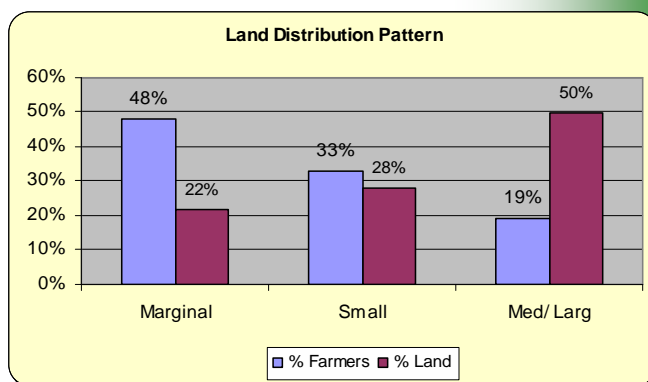
In terms of land use pattern, about 97% of the land is being cultivated, with 3% as fallow land.

<sup>1</sup> Details of categorization of households using socio-economic indicators is available with NCRC

### 5.2.2. Land Distribution:

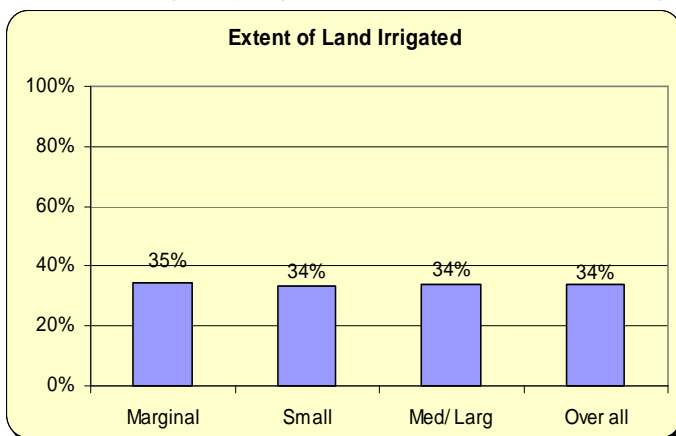
Analysis on the distribution of land among various profiles of farmers from the sample shows that about half of the marginal farmers own only a little more than one fifth of the land (as expected).

In terms of distribution of dry and wet lands, the proportion of wet lands (19%) with marginal farmers is marginally higher than dry land (17%). These wet lands are in most cases canal irrigated and therefore are very close to water bodies. These lands are highly vulnerable to flood related disasters.



### 5.2.3. Irrigation Facilities:

Overall about 34% of the land owned by these farmers is irrigated, with about 35% of the marginal farmers under irrigation (which is marginally higher than small and medium/ large farmers).



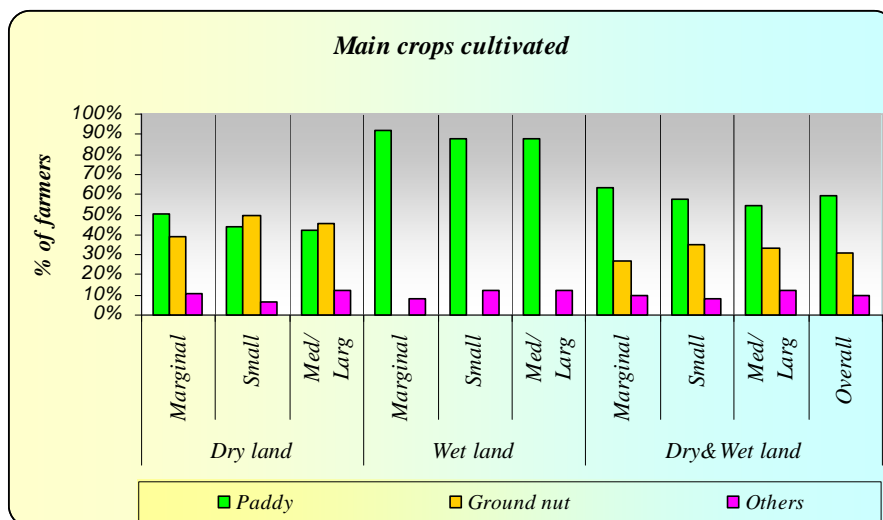
Farm ponds are the main source of irrigation (53%) closely followed by canal irrigation (43%) for the farmers. A small percentage used bore well also. At the habitation level too, of the 34 habitations covered, 56% of the land is irrigated through farm ponds followed by 41% area through canals.

In terms of type of irrigation practice followed, 99% of the farmers report using the method surface irrigation – flooding, as the regular practice

Even though the data related to irrigation shows reasonable acreage of land being irrigated (which is good for agriculture), the proximity of these lands to these canals and sea is an important vulnerability factor in this delta region. With more proportion of land of marginal farmers in wet land (and canal irrigated), their lands are more prone to floods and cyclones.



#### 5.2.4. Main Crops:



Main

crops

cultivated in the region have been paddy (close to 60% farmers), followed by groundnut (31%).

Higher proportion of marginal farmers cultivate paddy, as the proportion of canal irrigated land is higher for them.

In terms of dry and wet lands, groundnut is cultivated by about 45% farmers in dry lands. Close to 90% of farmers owning wet lands cultivate paddy.

Other crops that are cultivated in these coastal districts are black gram (10% of farmers) in wet land and sesame (gingelly) (5% of farmers) in dry land

#### 5.2.5. Trend in the Yield of Main Crops:

The study collected information on the yield per acre for main crops through focus group discussions with farmers of different categories. Yield (kg per acre) that is expected from the land during normal years for that particular habitation and the specific category of the farmers was taken as standard (after rounds of triangulation).

As can be seen from the data, the potential normal yield expected by marginal farmers is lower than that of other categories. This is due to various practices and low levels of inputs adopted by these farmers.

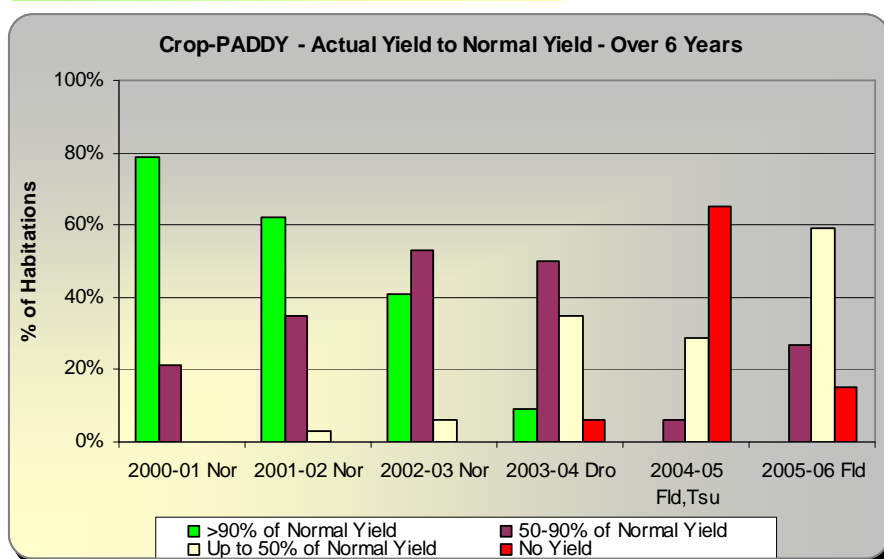
The study also collected data of trend in yield of major crops and related these yields with occurrences of disasters. The data is collected for the past six years, from 2000 to

2006. The data is collected both at habitation level (common for the habitation) and at the household level (providing details of how each category of farmers fared). The data is collected separately for dry and wet lands. The results are given below:

Normal Yield of Main Crops		
Crop	Category of Farmers	Kg/ Acre
<b>PADDY</b>		
Dry Land	Marginal	834
	Small	952
	Medium & Large	964
Wet Land	Marginal	1,158
	Small	1,176
	Medium & Large	1,302
<b>GROUDNUT</b>		
Dry Land	Marginal	766
	Small	865

The graph captures the trend in the yield of paddy over six years (at the habitation levels, for both dry and wet lands together).

As can be seen, the green bars (i.e. proportion of habitations reporting yields 90% and above then normal yield) is coming down over years, even during normal monsoon years (irrespective of disasters – 2000-01 to 2002-03 – normal years). The productivity seems to be coming down over years.

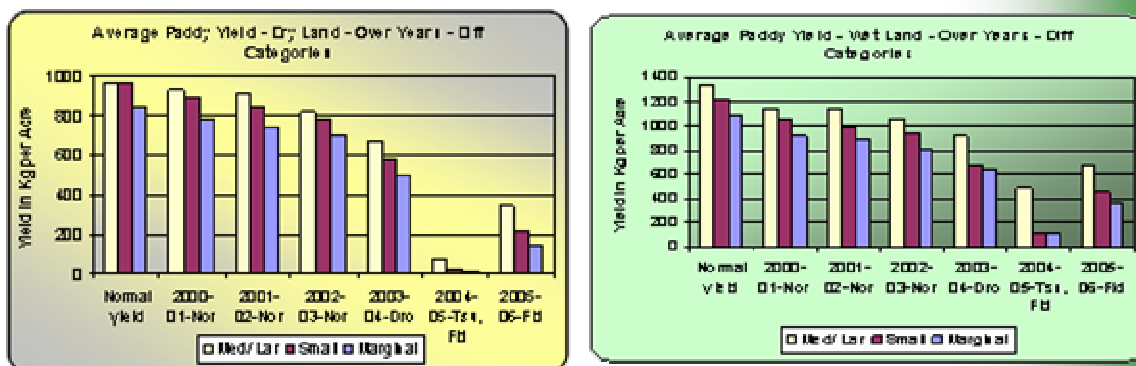


During the disaster years, i.e. 2003-04 (drought), 2004-05 (tsunami and flood) and 2005-06 (flood years), the proportion of habitation reporting 90% and above normal yield is close to nil. In fact, in the tsunami year, there has been complete crop loss due to lodging and salination, with about 50% of habitations reporting no yield at all. In

the current year of 2005-06, the reported yield is far better compared to other disaster years, main reason could be the interventions by various agencies in these coastal districts after tsunami. The trend is similar in both dry and wet lands.

The trend is similar for the other major crop groundnut too, with proportion of habitations reporting 90% and above yield coming down to 9% (in 2005-06) from 82% (in 2000-01).

The data for each category of farmers show that the trend is similar (see graph below).



The rate of decrease of yield compared to previous years is same across different categories of farmers. Given the socio-economic profile of marginal farmers, these decreases are likely to affect them the most.

### 5.3. Other Agricultural Practices:

#### Use of fertilizers:

Majority (91%) of the farmers (98% of the land in these habitations) reports use a combination of inorganic and organic fertilizers. Use of organic inputs alone is practiced in about 6% of the cultivated area.

#### Pests in crops:

Brown plant hopper is the most reported pest that attacks paddy in wet lands (with almost all habitations reporting affected by this pest), followed by Stemborer (with 35% habitation reporting). Leaf roller is also reported in a few habitations.

In groundnut, Caterpillar, Aphids and Leaf roller are reported to be main pests (about a third of habitations reporting these).

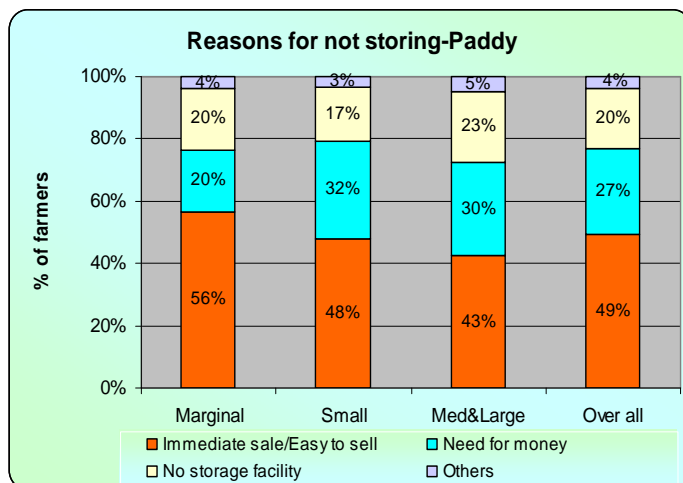
**Major diseases:**

In paddy, the major diseases reported have been Sheath blight (close to 60% of the habitations), followed by Tungro and Leaf spot. In groundnut, the main disease reported is Tikka leaf spot and Root rot.

**Storage:**

In terms of storage practices, about 53% of habitations report storage of paddy. The place of storage is mainly home; and usually stored to be used as food grain for the family.

In habitations where there is part sale or immediate sale, the reasons being that opportunities exist for immediate sale (through minimum support price; 38% of habitations), lack of storage facilities to store and wait for better prices (in about 9% of habitations) and the need for immediate cash. Storage facilities are reported in two habitations; facilities being godown of TNPC.



In terms of households, close to one half of farmers report immediate sale of produce after harvest. The proportion is higher for medium and large farmers as they have surplus to sell, whereas the marginal farmers tend to store paddy as food grain for the family. Here again, the main reason for non-storage is the availability of local

market for sale (if sold immediately after harvest). About 20% reported non-availability of storage facility as the reason for not storing paddy.

In groundnut, 90% of farmers sell off the produce immediately after harvest. Need for cash for household expenses and repayment of credit seems to be the main reason for selling off the produce immediately (57% of marginal farmers and 43% of all farmers quoting this reason).

The need for immediate cash, lack of storage facilities combined with availability of immediate marketing options at the village level facilitates sale of produce immediately after harvest (usually at a lesser rate). The storage if practiced is mainly for food security for marginal and small farmers, and only medium and large farmers store for obtaining better prices. At least about a fourth of farmers reported lack of facilities that prevents them from storing and getting better prices or use them in emergencies.

In about a fifth of habitations, farmers felt that the main problem in marketing immediately after harvest is that they realize much lower prices compared to normal prices if stored and sold after a few months. Lack of storage facility, lesser quantities and non-availability of immediate cash forces these farmers to sell off produce immediately. Support in these areas, such as grain banks, bulking up, etc., could be thought off, which will likely contribute to improving incomes from sale of these produce.

#### **5.4. Occurrences of Disasters, Impact on Farm Livelihoods and Coping Mechanisms:**

##### **5.4.1. Occurrences of Disasters:**

The study collected data for the past six years, of which three years have been normal years (i.e. 2000-01 to 2002-03). Three disasters have taken place in the last three years:

- 2005-06 (current year) – Floods
- 2004-05 – Tsunami and Floods
- 2003-04 – Drought

From the timeline analysis of these habitations, there was also drought that occurred during 1996-97, with occurrences of cyclone, storm and flood periodically. In addition to these, frequent rise of backwater flooding the agricultural land is common. The data shows that these occurrences have been frequent at the grass-root level, even though these occurrences have not received the same kind of attention that tsunami has. These have been affecting the livelihoods of farmers, particularly those whose lands are close to water bodies (mainly marginal farmers).

##### **5.4.2. Impact of Disasters on Farms and Farmers:**

The study collected information both at habitation level and individual farmer family level on the impact of these disasters on the livelihoods. The data is collected for the past six years, of which three years have been affected by disasters (two flood years

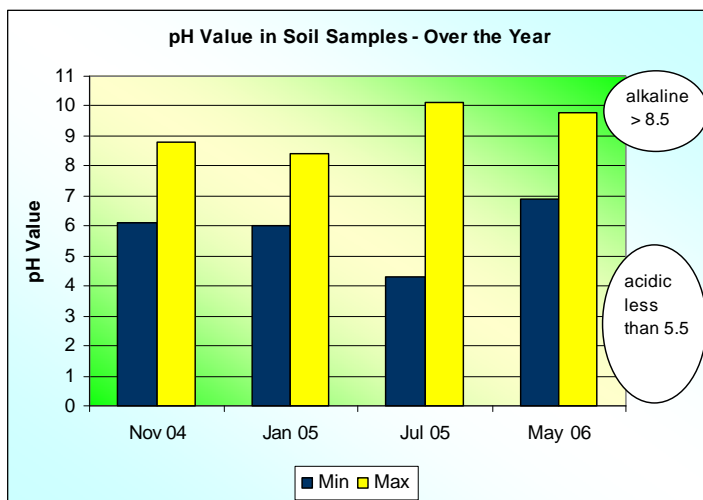
and one drought year). The data given below is based on type of disasters and its impact on farmer livelihoods.

The impacts of disasters have been at three levels:

- on the land and its fertility (short and long-term)
- on the standing crops – production, yield, quality
- on the food security and incomes of the family

### **Effect on Land and its Fertility:**

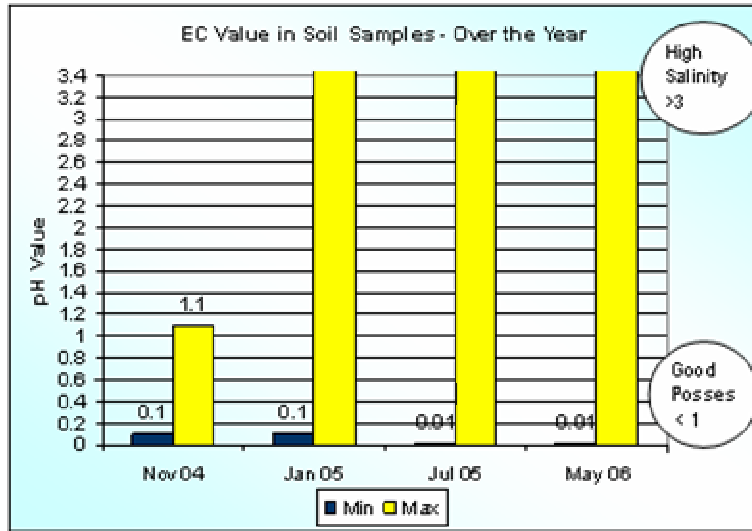
Test of soil samples from various fields of farmers by both government and the study team shows that there has been adverse effect on the quality of the soils due to these disasters. The DoA had collected samples over years, one just before tsunami (around Nov 04), followed by one in Jan 05 and July 05. The study team collected samples in May 06. The data available from DoA is only on Min and Max for each village.



The graphs show the standards for salinity. The red bands in the graph need treatment.

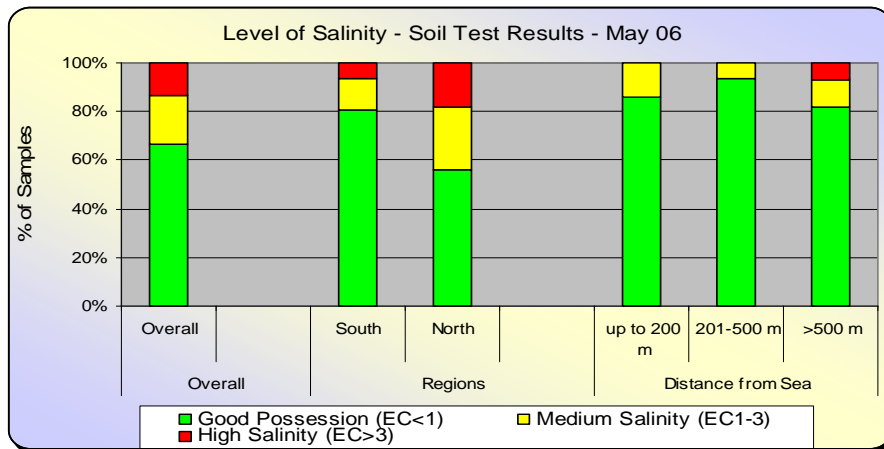
In terms of pH value, just before tsunami and after tsunami, the min and max values are within the range. However, in July 05 and May 05, in some habitations minimum levels show presence of acidic and alkaline soils.

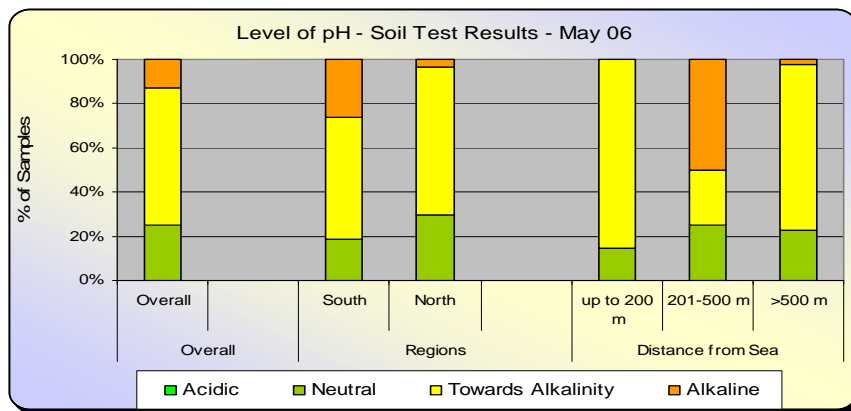
The data shows that there have been problematic soils in the villages of Nagapattinam district, both in terms of pH and EC values.



The field samples collected by NCRC study team from these habitations is analysed and presented. These samples are collected in May 05.

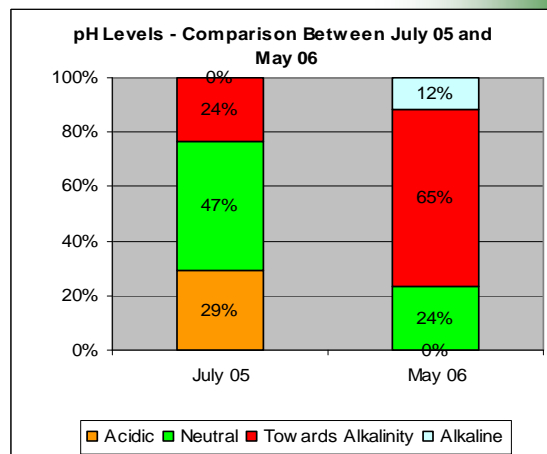
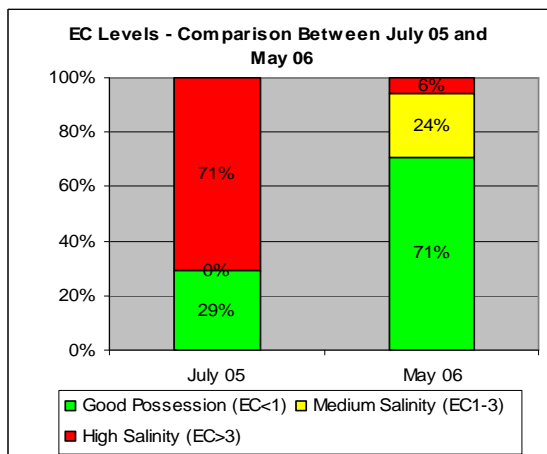
Overall, about 60% of the samples showed good possessions ( $EC < 1$ ), and about 10% showed high salinity ( $EC > 3$ ). The proportion of samples showing higher salinity was higher in the northern region, and in habitations that are  $> 500$  meters from the sea.





The results show that there has been higher proportion of alkaline soils in the samples selected from lands within 200 to 500 meters from sea. The proportion of samples which are 'towards alkalinity' also is very high. Neutral soils are only about a fourth of the samples.

The study also tried to understand the effect that the reclamation efforts have made in these habitations. Soil test data for comparison was available (at the individual farm level) in 17 cases. The EC and pH values of these are analysed and compared below:

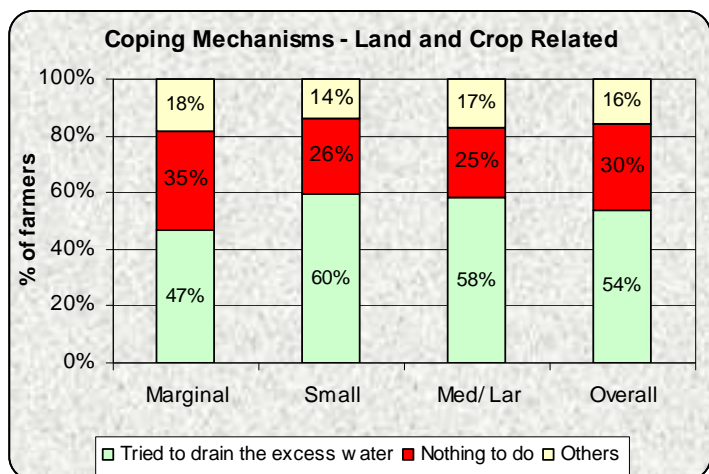


The results show major improvements in the soil quality in terms of reducing salinity (as shown in EC), with proportion of problematic samples coming down to 6% from 71% in July 05. Whereas the pH values show some increase in proportion of samples moving 'towards alkalinity' range after reclamation. This is an area to be probed further.



### 5.4.3. Coping Mechanisms:

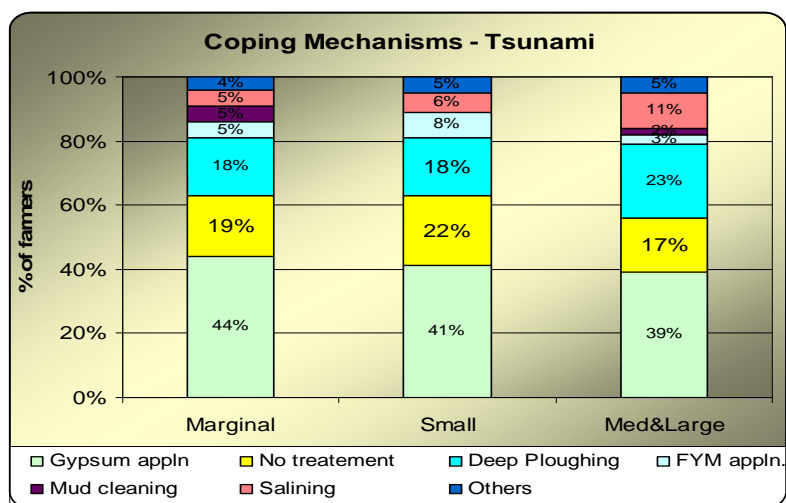
The coping mechanisms adopted by the farmers were studied in two areas – with respect to land and crop and the other managing their household chores.



More than a third of marginal farmers quoted that they did not do anything to improve the situation during flood situations. About half of these farmers tried to drain excess water. In terms of running the family, 43% marginal go to informal sources for credit (with high interest rates) and 28%

take up labour work either within village or migrate. The proportion of small and medium/ large farmers taking up labour work is limited. A large proportion (57%) of medium/ large farmers managed these with their own money (savings).

With respect to tsunami, the coping mechanisms adopted by farmers are given in the graph.



A large proportion of farmers practiced gypsum application, followed by deep ploughing (18 – 23%).

In drought years, about 90% of farmers reported that they would not be able to do anything except wait for rain. A few (less than 7%) reported deepening of farm ponds.

In the case of tsunami disaster, the household coping mechanism included government compensation in a major way (52% reporting). In flood years, about a fifth reported compensation from government and none in the drought disaster. Labour work is the main coping mechanism for marginal farmers to manage household expenses during drought period.

Many habitations reported that traditional physical structures (bunds, etc.) have not been maintained over the year due to lack of cooperation and ownership among the communities.

The coping mechanisms adopted by farmers have been on individual household's ability to access financial and other support. Most of the marginal farmers end up doing labour work or starve due to loss of livelihoods. They hardly get technical or financial support to return back to normalcy. This trend has been continuing over a long time thereby not allowing these communities to move out of this vicious poverty cycle. There are no safety nets for these farmers and their families to fall back. Even normal or good yield gained from some years are wiped out in one disaster.

## 6. Conclusions and Pointers for Ways Forward

### 6.1. Summary of Findings:

1. Agriculture is the main livelihood opportunity for a large number of poor and vulnerable households in this coastal district. Improvements in coastal agricultural sector in this district will contribute directly to improving and sustaining livelihoods of a number of poor and vulnerable families in the district.

The results of the study show that there is a large proportion of coastal communities and habitations in Nagapattinam District that are dependent on agriculture for their livelihoods, and most (close to 90%) of these families are poor and vulnerable (based on their socio-economic status). The economic status is directly linked to the extent of land holding, and therefore all the marginal farmers in these habitations are poor and vulnerable.

The land holding is skewed, with large proportion of marginal farmers owning very small proportion of agricultural lands. For these farmers, agriculture is the main occupation with supplementary occupation being only labour, with very little or no diversified sources. The occupational profile shows that any problems in agriculture will directly affect the livelihoods and food security of most communities in these habitations. Improvements in coastal agricultural sector in this district will contribute directly to improving and sustaining livelihoods of a number of poor and vulnerable families in the district. The study indicates that this important livelihood of poor and vulnerable coastal agricultural communities has been frequently affected by disasters that pull them back into the vicious poverty cycle.

2. Results show a decreasing trend in the yield from agricultural land over the years (even during normal years, irrespective of disasters), which is an area of concern. The salinity in the soil and lower fertility of soil (indicated through NPK values from soil test) seem to be main factors contributing towards this decreasing trend. The efforts taken up by various agencies with coastal agricultural communities in the tsunami rehab phase is an opportunity to address these long-term issues too.
3. There has been an increasing trend in the occurrences of disasters in the past few years. The coastal agricultural communities of Nagapattinam have faced a number of disasters over a period of time. Flood and drought have been the main disasters that have struck this area over years, with tsunami being the recent one. The most important immediate impact of these disasters being reduced or total loss of

production from the particular season, and reduced productivity of land due to salination (during floods) or lack of irrigation (during droughts).

4. The effects of disasters are much wider than just loss to physical or tangible assets (such as land). These affect different profiles of communities in different ways. The result of these disasters has reduced food security for families, in some cases even starvation, forced labour work or migration and increased debts. Of the various profiles of farmers studied, the marginal farmers are the most affected because of their poor socio economic status and closeness of their land to sea/ river beds. Most farmers reported not taking up any actions (such as reclamation, draining, etc.) during the times of disasters due to lack of knowledge on technical areas combined with lack of access to financial and other support services.
5. Some communities have certain coping mechanisms which are limited to only borrowing and taking up labour to manage difficult periods after disasters. These have been on individual household's ability to access financial and other support. Most of the marginal farmers end up doing labour work or starve due to loss of livelihoods. They hardly get technical or financial support to return back to normalcy. This trend has been continuing over a long time thereby not allowing these communities to move out of this vicious poverty cycle. There are no safety nets for these farmers and their families to fall back. Even normal or good yield gained from some years are wiped out in one disaster.
6. The responses to these disasters from government and other agencies seem to be adhoc, temporary and reactive. There has been very little or no effort to mitigate these disasters or to help communities to prepare themselves to face and manage future disasters. Most times the responses are limited to cash compensation based on land holding pattern.
7. Tsunami, even though has devastated lives and livelihoods of many, has brought to focus the problems faced by coastal agricultural communities in the district. The communities too are interested to work on these issues to mitigate themselves from future disasters, with support from government and other agencies. It is the right time to evolve and implement effective strategies involving communities and other facilitating agencies to mitigate future disasters and ensure sustainable farm based livelihoods of the vulnerable coastal agricultural communities.

## 6.2. Pointers for Moving Forward:

1. The study has shown that when there been facilitative support (year 2005-06) in terms of technical, social and financial through government and other agencies, the adverse effect of these disasters have been reduced to a large extent. The proportion of actual yield to normal yield has been much higher than other disaster stuck years. This is an indication that the adverse effect of disasters could be reduced by support in different areas, technical and others.
2. The study indicates that that the support to communities to mitigate and manage these disasters should be multi-pronged. Any one type of solution is not likely to yield sustainable results. Some pointers towards this have emerged during the study. The support should be in the areas of technical, financial, social and physical. Two broad areas of support have emerged – Disaster Preparedness and Responses to Disasters.
3. Disaster Preparedness:
  - a. Vulnerability mapping (technical and socio-economic) of the agricultural habitations, lands and communities; understanding their profiles, practices and support mechanisms in place (the study could be the first step towards this)
  - b. Building capacities of the farmers in the areas of cropping patterns, soil and crop management, package of practices, etc.
  - c. Developing mechanisms that can ensure easy access to resources such as organic fertilizers and other technical inputs, particularly for the marginal farmers, who are most vulnerable.
  - d. Developing security nets such as savings, credit during emergencies and for inputs, and insurance through group approaches and linkages with existing institutions
  - e. Strengthening farmers based organizations (self help groups or other forms of community based organizations) to undertake the above mentioned tasks through a community based approach. The same institutional mechanism could also take up developing and maintaining local level physical structures for mitigating disasters, information dissemination, building awareness among communities on disaster preparedness, and take up collective actions in agriculture.
  - f. At the district level, there needs to be a central mechanism that ensures periodical review of these activities at various levels and geographical areas, identify gaps and facilitate learning and negotiating platforms to improve the disaster preparedness strategies.

- g. The district level monitoring and support mechanism needs to be integrated with national disaster management institutions so that the field level processes and understanding is used as the basis for policies and decision making at the highest levels. The policies and decisions from the national level should then again percolate to the State & District disaster management institutions.

4. Responses to Disasters:

- a. There is a need to develop systems that can ascertain compensation packages that are scientific, which combine both technical and loss of livelihoods (i.e. going beyond tangible and physical losses). There is a great need to work on hardcore data to arrive at these. It is also important to have community consultations and involvement at various levels to ensure that the packages/ norms etc are appropriate and effective to local situations.
  - b. Developing broad disaster-specific guidelines for reclamation in disaster situation at national level which should be a mix of indigenous and scientific knowledge arrived on a community participatory basis. The habitation level vulnerability mapping could provide valuable inputs for developing these.
  - c. Establishing institutional mechanism at the district level that ensures coordination of inputs during disaster situation, quick dissemination of information and provides access of financial and other resources, particularly for the most vulnerable
5. Each of the above areas could be supported by a variety of institutions such as government departments, banks and financial institutions and facilitating agencies such as NGOs. The approach needs to be community-based with communities empowered to assess, plan, execute and maintain structures and systems to mitigate and manage future disasters.



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