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# STRENGTHENING RESPONSES TO CLIMATE VARIABILITY IN SOUTH ASIA

## Discussion paper: India

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April 2013

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## Executive summary

Drawing on field-research and consultations with policymakers, practitioners and academics, this case study looks at the dimensions of local resilience in two communities living around Chilika Lake in Odisha (formerly Orissa), the biggest brackish water lake in India. Both communities are entirely dependent on the lake for their livelihoods; the first community, living on the stretch of the lake shore closest to the sea mouth, is a fishing community and the second, villagers living on the northern, inland lake shore, carry out salt farming.

In order to understand local resilience, the case study aims to address two key questions:

1. What are the root causes of vulnerability (to climate and conflict risks)?
2. How can external adaptation interventions (by the state or international institutions) address these root causes of vulnerability?

Findings from this study point to the following as key priority areas to build resilience:

- A comprehensive lake management policy that supports regulations and enforcement for effective management and equitable distribution of the lake resources;
- The availability of formal credit mechanisms that make loans available to the fishing communities on soft terms for their basic capital requirements to reduce their dependency on middlemen and the mafia;
- Livelihood diversification options to ones that are not directly dependent on the lake.

This study is one of a series of regional studies which aim to present evidence of the interactions between environmental, social, political and economic risks at the local level in Bangladesh, India, Nepal and Pakistan.

## 1. Introduction

This case study looks at opportunities for strengthening resilience in fragile contexts. It aims to do so by identifying the root causes for vulnerability and non-adaptation to the implications of climate and environmental change in two communities living around Chilika Lake in Odisha, India. Both communities are entirely dependent on the lake for their livelihoods, the first community, living on the stretch of the lake shore closest to the sea mouth, is a fishing community and the second, villagers living on the northern, inland lake shore, carry out salt farming. Both communities are highly exposed and sensitive to climate and environmental risks to Chilika Lake.

The study aims to understand the different risks, challenges faced and dimensions of resilience available to these different communities and the differential way in which environmental change and actions by the Lake Development Authority affect the different groups positively and/or negatively. By looking at current experiences of vulnerability as a result of environment change, climate-related interventions, and existing socio-economic dynamics, the study aims to identify obstacles to and opportunities for climate interventions to build resilience to interlinked environmental and security risks amongst different livelihoods groups dependent on the same natural resource.

Climate change impacts will inevitably be experienced at the local level and, as a result, responses which address these local impacts will be the most effective. However, desk research in preparation for this project revealed that the large majority of policies on adaptation are made at the capital city or headquarters level. Furthermore, there is little empirical evidence of local-level experiences of climate change impacts, taking into account existing peace and security challenges faced in fragile contexts, available to inform top-down approaches.

In order to understand local resilience, the first question which this case study aims to address is: **what are the root causes of vulnerability (to climate and conflict risks)?** For this, we first looked at the nature of the environmental risks faced and their interaction with existing dimensions of peace and security at the household and village level. The second central question of this paper is: **how can external adaptation interventions (by the state or international institutions) address these root causes of vulnerability?**

This study is one of a series of regional snapshots, which aims to present current empirical examples and qualitative evidence of the interactions between

environmental, social, political and economic risks at the local level in Bangladesh, India, Nepal and Pakistan. The research is part of a small-scale pilot project. It is therefore beyond the scope of this paper to provide a comprehensive national survey or in-depth analysis of climate data. Some of the views expressed will be contested, contradicted and contentious, but the research methodology aimed to ensure that as broad a range of views as possible could be collected, so that those developing adaptation responses could have a deeper understanding of the complexities around perceptions and realities. It is intended that further analysis will build on these reflections as part of a necessary discussion on adaptation and resilience in conflict-affected contexts. A summary of key findings from across the four case studies and policy recommendations can be found in the separate executive summary.



## 2. Context

**India** is the second most populous country in the world with a population of 1.2 billion people. Despite having the second fastest growing economy in the world, 42 percent of its population still does not have access to commercial energy and 70 percent continue to be dependent on climate-sensitive sectors such as agriculture, fishing and forests for their livelihood. The climate policy landscape in India is becoming more active and ambitious.<sup>1</sup> Although the national and state policies on climate change are still guided by the need to eradicate poverty while encouraging economic development,<sup>2</sup> the National Action Plan on Climate Change (NAPCC, 2008) sets the approach for India's response to this global change, by emphasising current pressing issues for the country in forestry, water use and supply, agriculture, energy and capacity development with co-benefits for addressing climate change.

This case study focuses on two communities living on different sides of Chilika Lake in Odisha. According to one key informant, **Odisha**, situated on the east coast of India, is the 'disaster capital of India'. Odisha's geography makes it prone to disasters, experiencing frequent floods, droughts and catastrophic cyclones. The state is also one of the poorest in the country, with 90 percent of the population living in rural areas and 57 percent living below the poverty line.<sup>3</sup> Poverty combined with high exposure and sensitivity to environmental risks renders the majority of the rural poor of Odisha vulnerable to climate change. In the face of pressing climatic challenges and threats from natural disasters, both of which pose a significant risk to economic development, Odisha has become the first state to produce a comprehensive state climate change action plan.

Odisha's State Climate Change Action Plan (CCAP, 2010–2015) identifies disasters as priority issues for adaptation. Such disasters include droughts, floods and cyclones, erratic rainfall and saline water ingress, water dependence of agriculture, and the prevalence and risk of aggravation of diseases such as malaria. With regard to mitigation, the plan refers to renewables such as solar and biomass, along with initiatives for energy efficiency promotion and sustainable practices for small mining companies. It also refers to initiatives aimed at using forests as carbon sinks, promoting cleaner production technologies and checking on emissions in the

1 A. Atteridge, M.K. Shrivastava, N. Pahuja and H. Upadhyay (2012). 'Climate policy in India: What shapes international, national and state policy?', *Journal of the Human Environment*, Vol. 41, pp.68-77.

2 Prime Minister's Council on Climate Change, Government of India (2008). *National action plan on climate change*. Available at <http://www.pmindia.nic.in/Climate%20Change.doc>

3 Institute of Development Studies (IDS) (2010). *Building climate resilience at state level: Disaster risk management and rural livelihoods in Odisha*. Strengthening Climate Resilience Discussion Paper 5.

transport sector. In addition, the plan identifies certain cross-cutting issues such as afforestation/reforestation and the sustainability of urban habitats.

**Chilika Lake** is situated on the eastern coast of Odisha and spread over the three districts of Puri, Khorda and Ganjam. The lake is the biggest brackish water lake in India, covering 1,100 square kilometres, and the second largest in the world. It is situated in the Bay of Bengal, which is one of the six major cyclone-prone areas in the world.<sup>4</sup> Chilika Lake has been the source of livelihoods for over 100,000 fishing communities. For centuries, these fishing communities followed traditional methods of fishing. Traditional practice entailed the use of different types of fishing implements, such as bamboo traps or bamboo nets, to capture different seafood in fishing grounds that were allocated on the basis of lineage.

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<sup>4</sup> Centre for Science and Environment (2001). 'Orissa factsheet: Climate change and Orissa', *Global Environmental Negotiations*, Vol. 2. New Delhi.

### 3. Methodology

#### Definitions

In this study, climate risks are conceptualised as the product of exposure, sensitivity and adaptive capacity.

*Exposure:* ‘The nature and degree to which a system is exposed to significant climate variations.’

*Sensitivity:* ‘... the degree to which a system is affected, either adversely or beneficially, by climate-related stimuli.’

*Adaptive capacity:* ‘The ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.’<sup>5</sup>

The study opts to supplement the Intergovernmental Panel on Climate Change (IPCC) definition of adaptive capacity to take account of broader social issues. As such, we adopt the term “resilience”. The concept of resilience lacks a universally accepted and precise definition. However, for this project, we adopt a framework for resilience which is based on a broad conceptualisation of the term and which also draws on the principles of resilience to conflict.<sup>6</sup>

We define resilience as: ‘The ability of countries, communities, and households to anticipate, adapt to and/or recover from the effects of potentially hazardous occurrences (natural disasters, economic instability and conflict) in a manner that protects livelihoods, accelerates and sustains recovery, and supports economic and social development.’<sup>7</sup>

When looking at exposure and sensitivity, this research does not aim to distinguish between climate change and environmental change, but rather looks at the two together. Only weather-related events – for example, storms, floods, temperature extremes, extreme events and changing rainfall patterns – are incorporated.

5 Intergovernmental Panel on Climate Change (IPCC) (2001). *Climate change 2001: Impacts, adaptation and vulnerability*. Annex B: Glossary of terms. pp.981-996. Available at <http://www.ipcc.ch/ipccreports/tar/wg2/>

6 See: D. Smith (2004). *The Joint Utstein study of peacebuilding*. Evaluation Report 1/2004. Oslo: Norwegian Ministry of Foreign Affairs.

7 Interagency Resilience Working Group (2012). *The characteristics of resilience building: A discussion paper*. Available at <http://community.eldis.org/?233@0.5ad4406d!enclosure=.5ad4406e&ad=1>

The study looks at responses to climate variability which can build resilience to combined climate and conflict risks. It is worth noting here that it is violent and armed conflict that we are interested in preventing. **Conflict** occurs when two or more parties believe that their interests are incompatible, express hostile attitudes or take actions that damage the other's ability to pursue its interests. "Violence" is often used interchangeably with "conflict", but violence is only one means among many that parties might choose to address a given conflict. Non-violent conflict is a normal part of development and human interaction. When violence erupts, however, a profound breakdown in social relationships occurs that will have destructive effects. Armed conflict takes this even further, when violence is organised and sustained over a period of time.

**Conflict sensitivity** is defined in this project as the capacity of an organisation or individual to:

- Understand the context in which it operates;
- Understand the interaction between its operations and the (conflict) context; and
- Act upon the understanding of this interaction in order to avoid negative impacts and maximise positive impacts on the (conflict) context and the intervention.<sup>8</sup>

## Site selection

Odisha was selected as a study site based on the existence of ongoing security risks in the region,<sup>9</sup> combined with high sensitivity and exposure to climate risks.<sup>10</sup> Active security risks across Odisha restricted study site selection. However, environmental exposure, local-level conflicts and safe access for the research team were all present in the Chilika Lake area.

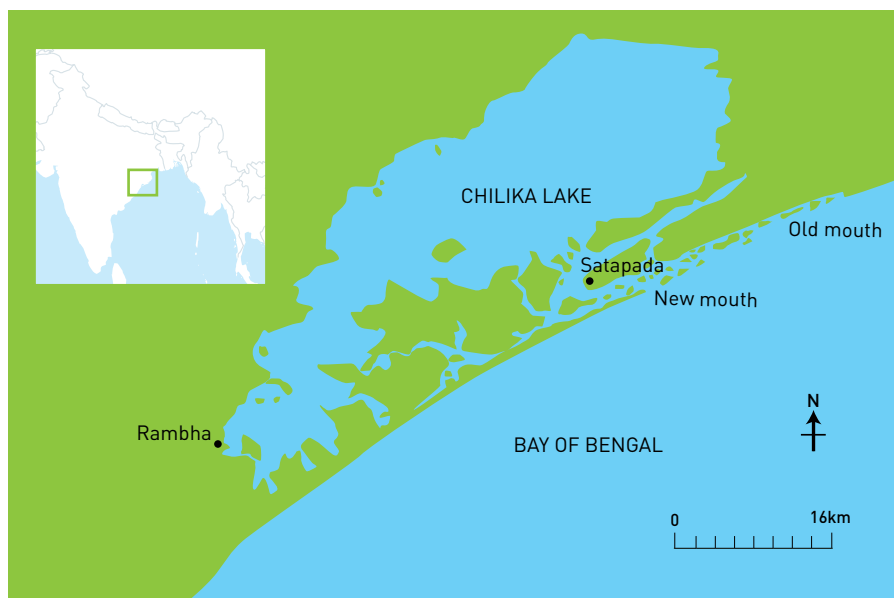
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8 Conflict Sensitivity Consortium [2003]. *Conflict-sensitive approaches to development, humanitarian assistance and peacebuilding: A resource pack*. Available at <http://www.conflictsensitivity.org/publications/conflict-sensitive-approaches-development-humanitarian-assistance-and-peacebuilding-res>

9 According to partial sources, 75 people were killed in Maoist-related violence in Odisha in 2011, 108 in 2010, 81 in 2009 and 132 in 2008. See: 'India Maoist Assessment: 2012', South Asia Terrorism Portal website. Available at <http://www.satp.org/satporgtp/countries/india/maoist/Assessment/2012/indiamaoistassessment2012.htm>. While it was not possible to validate these figures, they give an indication of the security situation in the state.

10 The original study intended to look at Assam and Odisha. However, active violent conflicts and protests linked to flooding and embankment breaches prevented the research team from travelling to Assam during the research period.

## Case study area: Chilika Lake, Odisha



The issues of the traditional fishing communities and the salt farmers in Ganjam and Puri districts form the focus of this case study. Ganjam is situated at the south-western corner of Chilika Lake. Within this district, the research team visited fishing communities in Ramha and salt farmers in Jharkhuda, a settlement of 15 villages with a total population of approximately 5,000 people and located along an old canal called the Saheb canal in Chilika. In Puri, research was conducted in Satapada, a fishing village situated around the old and new sea mouth where Chilika Lake opens up to the Bay of Bengal. Ganjam and Puri were selected because they are located at opposite ends of Chilika Lake. Communities in both districts are almost entirely dependent on the lake. However, environmental changes and interventions (by business actors and the Chilika Development Authority (CDA)) affect communities in these districts in different ways.

### Data collection and analysis

Data collection methodology drew on grounded theory (GT) and elements of structured focused comparison (SFC). Given the small-n and comparative nature of the study, GT alone would not have been suitable to build a theory based on such a small and diverse sample size. However, since the first aim of the research was

to understand the dimensions of resilience and the implications of climate change and conflict, aspects of the GT approach offered an effective way to conceptualise what was going on. The broad survey questions were designed to be sufficiently open to capture what specific issues were being faced at the local level, what the main challenges faced by the participants were and how they were trying to solve these challenges.

The interviews were structured and questions were loosely focused around the independent variables (climate and environmental change events, the political context and external interventions). However, they were sufficiently open to also capture other factors outside of these which could play a significant role in affecting resilience as well.

The study adopts an analytical framework for resilience which aims to understand the root causes of vulnerability to complex risks, as identified by respondents in the field research. The framework thus integrates a livelihoods approach and disaster risk-reduction approach. Moreover, given the focus on fragile contexts, it draws heavily on the peacebuilding frameworks<sup>11</sup> which identify the foundations for peace and security.

Field research was carried out in April 2012 in the Ganjam and Puri districts, as well as in Bhubaneswar, the capital city of Odisha state. The field research is based on 17 key informant interviews and 68 respondents.<sup>12</sup> Respondents included fishing communities, salt farmers, non-fishing communities, middlemen and “mafia”, journalists, representatives from a self-help cooperative, the president of the salt farming communities, the chief of the CDA, the Secretary of Wildlife Conservation and a non-governmental organisation (NGO) called the United Artists’ Association (UAA). To supplement the field research, a desk review of national policies was conducted and additional interviews were carried out with governmental and non-governmental organisations in Delhi in April 2012.

Based on these findings, we explore the different risks and dimensions of resilience experienced by different communities dependent on the same natural resource. The study looks at the ways in which each community is affected by environmental change, national adaptation strategies and interventions. The final section of this case study identifies key actors and priority areas of engagement to effectively strengthen resilience to climate variability across different livelihood groups, such as the salt farmers and the fishermen.

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<sup>11</sup> D. Smith (2004). *Op. cit.*

<sup>12</sup> Some 34 respondents were female. All efforts were made to ensure that different socio-economic, age and ethnic perspectives were also covered in our selection of respondents.

## 4. What are the climate and environmental change related risks faced by communities?

Odisha's geography at the head of the Bay of Bengal makes it prone to disasters. Slight changes in the Bay of Bengal can have immediate impacts on the coast. The Bay of Bengal is at the centre of low pressures causing heavy rains and cyclones in the sub-continent and especially in Odisha. The impacts of contrasting and fluctuating extreme weather conditions in Odisha – from heat waves to cyclones, from droughts to floods – are particularly striking. Observations from community respondents support the findings of the desk review, showing increased variability in the timings of extreme events.

A heat wave in 1998 killed around 1,500 people, mostly in coastal Odisha, a region otherwise known for its moderate temperature.<sup>13</sup> The frequency of cyclones has increased on the Odisha coast. Notably, in 1999, two cyclones hit the state in quick succession, affecting 15 million people and devastating 17,000 square kilometres of agricultural land.<sup>14</sup> The second cyclone lasted three days and ravaged 14 coastal districts.

In Odisha, over 80 percent of annual rainfall occurs during the monsoon season, with an average of 1,400 millimetres over approximately 70 days of rainfall (Institute of Development Studies (IDS), 2010). However, Odisha has been experiencing either heavy floods or drought every other year due to disproportionate distribution of rainfall. In recent years, irregular rainfall causing both floods and droughts has become a major cause for concern. The monsoon of 2001 recorded the worst ever flooding in Odisha, with 25 of the 30 districts inundated. The floods affected one-third of the state's 30 million residents. Areas with no prior history of floods, such as districts in western Odisha, were also submerged as a result of the heavy floods. In the same year, ironically, Odisha suffered one of its worst droughts, affecting the lives of 11 million people in more than two-thirds of the state's districts.<sup>15</sup>

A number of respondents involved in farming observed saline water ingress in the study sites. Major pollution and water quality issues are also emerging with the onset of industrialisation and urbanisation. Environmental degradation through deforestation, coastal vegetation/wetlands loss and soil erosion has increased the intensity and range of disasters, with more areas within the state now being vulnerable to disasters.<sup>16</sup>

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13 Centre for Science and Environment (2001). Op. cit.

14 Ibid.

15 Ibid.

16 IDS (2010). Op. cit.

Based on our desk survey from 1981 to the present day, the ecosystem of Chilika Lake in Odisha has encountered numerous and varied climate and environmental threats. Such threats include siltation from the inland river systems, a decrease in salinity and fishery resources, and an overall loss of biodiversity with a decline in productivity affecting the livelihoods of many fishing communities. The severity of the problems faced by the lake eventually led to its inclusion in the Montreux Record in 1993.<sup>17</sup>

However, the two main environmentally linked risks raised by over 80 percent of community respondents were due to human actions: firstly, the creation of a new lake mouth by the CDA; and secondly, the rapid expansion of prawn (*gheri*) farming in Chilika Lake. There was consensus among local fishermen, CDA officials and expert respondents interviewed that *gheri* farming has been detrimental to the lake's natural biodiversity and has affected the livelihood of the fishing community.

According to CDA officials, the construction of the new mouth in Chilika was a CDA initiative to counter the salt water intrusion and increased siltation that was observed to be affecting the lake's biodiversity. While no comprehensive evaluation was available to measure the social and economic implications of this engineering measure, CDA officials and the key informant from Wildlife Conservation claimed that this was increasing fish stock in the lake. However, fishing cooperatives claimed that their fish catch was decreasing as a direct impact of the new mouth.

Livelihoods in Jharkhuda are dependent on salt farming along the Saheb canal, which is a tributary into Chilika. This alternative livelihood option was created as a by-product when an opening was engineered in Chilika Lake more than 100 years ago. The water from the Bay of Bengal came in through this opening, salinising the land and rendering it unfit for traditional agriculture. Communities adapted to the changing situation by harvesting and selling salt for their livelihoods. About eight to 10 villages in Jharkhuda have been completely dependent on salt farming for their livelihoods for more than 100 years. However, the CDA engineered a new opening in 2004 and a new canal, deeper than the Saheb canal, was created to allow water to flow from the new opening. According to the local CDA officials, the new opening had to be created because siltation in the old one was affecting the biodiversity of the lake. However, respondents from the salt farming community and three expert key informants agreed that this intervention drastically reduced the flow of saline water feeding into the salt farms through the Saheb canal, thus affecting the livelihoods of the salt farmers.

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<sup>17</sup> The Ramsar Advisory Mission recommended the removal of the lake from the Montreux Record following restoration measures taken by the Chilika Development Authority (CDA). Chilika Lake was therefore removed from the Montreux Record, with effect from 11th November 2002.



## 5. What are the pre-existing social, political and economic risks faced?

Risks to livelihoods were consistently ranked highest as the biggest problem facing fishermen and salt farming communities. Over 78 percent of community respondents identified the growing issue of shrimp cultivation by private companies and wealthy individuals as a major threat to traditional fishing and other livelihoods. Linked to this problem, respondents identified issues around ownership of land and water leasing rights, lack of clear and transparent management of Chilika's water resources, and the lack of political voice and influence of the poorest members of society. These issues are elaborated below.

### Livelihoods and assets

According to respondents from the fishing cooperatives, traditional methods of fishing such as the use of bamboo traps or bamboo nets have been used by fishing communities for centuries. However, in the 1990s, the state government in Chilika introduced prawn farming. According to the fishing community respondents, this decision was made so that the state could earn export revenues. Prawn farming is undertaken using a technique locally known as *gheri*, which means an enclosure. This has affected the local fishing communities by restricting their access to those parts of the lake under *gheri*, which they would have otherwise used to fish.

Anecdotal evidence from fishermen interviewed suggests that, in the last two decades, the fish catch has declined as a direct result of the introduction of *gheri* farming.<sup>18</sup> Villagers in a focus group held in the UAA premises mentioned that they had had their own means of fishing using cages according to fish species and the sub-castes which they belonged to. However, private fisherman involved in *gheri* farming had invested capital and technology which the traditional fishermen could not match. Lack of regulation over the lake resources and high returns from prawn farming incentivised external groups – people belonging to higher castes and those from economically better sections of the society popularly known as the “mafia” – to claim a stake in the lake. Traditional fishermen have been unable to switch to *gheri* farming, as it requires investment. Moreover, because it is illegal, it is primarily carried out by the so-called mafia, who have the muscle power, political patronage and capacity for investment. Although there are fishermen cooperatives, they too encourage the local fishermen to lease out, as the cooperatives themselves have little money for capital required for *gheri* cultivation. The introduction of

<sup>18</sup> The research team was not able to validate this claim. However, regardless of the scientific accuracy, the research team observed that this *perception* and related mistrust and hostility between fishermen and shrimp farmers had clearly affected community relations.

*gheri* farming has therefore reduced the livelihood space for the fishermen who have historically been dependent on the lake for their livelihoods.

Due to falling revenue from fishing, a significant minority of respondents from the fishing community in Rambha and Satapada (38 percent) stated that they were now involved in *gheri* farming in some way. Some who had leases were informally sub-leasing their water rights to ‘outsiders who have more money for modern fishing’; others were working as daily wage labourers for the *gheri* owners. These individuals agreed that, if they had access to capital or loans, they would be able to afford boats, nets and better equipment and would not sub-lease to *gheri* farmers. One respondent noted: ‘I know that these are short-term solutions and I know that my actions are bad for fishing for my son and grandchildren.’

The salt farmers who were primarily dependent on the flow of saline water for production of salt are similarly faced with a livelihood crisis since the 2004 engineering intervention of the CDA that led to the reduction of the saline water flow feeding into the salt farms through the Saheb canal. Although the CDA deepened the Chilika canal, it did not repair the Saheb canal. Coupled with this, the opening of the new mouth has affected the production of salt. According to the Secretary of the Salt Farmers’ Association, the salt marketing/purchasing company Joyshree filed a case against the farmers, as they were unable to meet the demand for salt due to low production. Joyshree has since taken to procuring salt from Gujarat and Andhra, purchasing whatever little production of salt is possible from these communities at a lower rate. The secretary claimed that a meeting was conducted with the district administration to ensure that the local purchase of salt was at a locally appropriate rate for the farmers; however, in return a case was reportedly filed against the farmers.

A large number of respondents from the fishing community (within cooperatives and individuals) identified the absence of a credit system, and/or any social protection mechanisms to safeguard their livelihood interest, as a major challenge. A smaller number of respondents raised this as a source of grievance. Fishermen claimed that lack of credit has pushed them to take loans from middlemen and/or to sublease their fishing grounds to the richer external groups, such as the mafia, for prawn farming. In return for loans or credit with a high rate of interest, the middlemen reserve the right to purchase the fish catch at a lower rate than the market price. In one interview, an official stated that middlemen are ‘happy to keep the loan alive’ and in doing so are forcing the fishermen into debt traps by arranging long-term loans lower than market rates for fish catch. In the face of poverty, despite the unfavourable terms, communities feel that this group of middlemen and mafia provide them with some sense of security and insurance.

A salt farmer in Jharkhuda village noted that, ‘without them, there would be no source of income for us as our agricultural holding is very small’.

## Governance and power

Different authorities are responsible for managing different aspects of the lake and its resources, and there is no single agency responsible for the lake as a whole. For example, the ownership of the lake lies with the Revenue Department. The responsibility for implementing regulations pertaining to the lake (for example, dismantling of illegal prawn farms) lies with the Water Resources Department. Law enforcement lies with the local police force, while the CDA is the technical body responsible for its upkeep and maintenance. The significant majority of respondents agreed that these departments more often than not work independently of each other.

There was consensus among respondents from the fishing cooperatives in both Ganjam and Puri that they have no links with the CDA, some not even with their own village councils. The president of a previously active but now defunct self-help group in Arakhuda village recounted how they continuously lobbied the CDA through letters and public demonstrations, demanding the abolition of prawn farming; however, there has been no response from the authorities to their demands. Similarly, despite repeated requests from the salt farmers to meet with the authorities to discuss the effects of the 2004 opening of the lake and construction of the new canal, the authorities have failed to respond with any solution or alternative means of livelihood.

The fishers cooperatives and the Salt Farmers’ Association, both once strong collectives constituted for the social and economic wellbeing of the communities, are now mostly defunct (in the case of the salt farmers) or/and highly politicised. Increasingly, richer non-fishing communities and political parties are influencing the membership of cooperatives, since it is through this mechanism that “civil society” can lobby government policies. Respondents mentioned that cooperatives encourage and make deals with middlemen as well as persuade fishermen to sublease their fishing grounds to the mafia for prawn farming. This could be because the cooperatives either lack the capacity and capital to function and/or are politically influenced, as increasing outmigration of traditional fishermen and salt farmers in search of livelihood options has created the space for non-fishing groups to occupy this space.

## Safety and security

Each fishing community village has been allocated a portion of the lake system by the Revenue Department, and they are granted the right to fish in their designated waters through leases from the State Fisheries Department for which the fishing families pay a tax. However, in reality, respondents cited a lack of clearly defined boundaries and overlaps in fishing territory which have resulted in instances of encroachment and conflict. Near the Satapada area in the Puri district, respondents reported that a number of deaths occur every year as a result of such conflicts, which usually involve shootings and bombings. An official confirmed this: ‘Villagers are now armed. The rivalries are fuelled by grenades and guns. In every village, there is an incident or two of documented cases. Cases pertaining to such intermittent local conflicts are pending in the court.’

Respondents from Rambha in the Ganjam district also mentioned that policing of the lake is partial on economic lines. They gave examples of fishermen taking part in political demonstrations to force the police to take action to dismantle the prawn farming enclosures. However, these are only temporary measures and within weeks things return to the same situation. Some respondents felt that the police action is tokenistic and that both the police and media turn a blind eye to the issue.

## Access to justice

Respondents from the fishers’ cooperatives and the Salt Farmers’ Association raised concerns about the lack of clear ownership and rights to access the resources of Chilika Lake. One respondent posed the question: ‘Who should have control over the lake – the state, business interests or the local village people?’ Traditionally, leases for the lake were granted by the local government to seven independent and autonomous fishing cooperatives, which would then allocate plots to their members based on their need and traditional inheritance. However, both fishing and salt farming communities highlighted examples of where private business actors (“mafia”) from outside the geographic community have gained privileged access to these rights.

Cooperatives were traditionally the first stop for airing and resolving grievances between fishermen. However, according to the heads of two cooperatives, 80 to 90 percent of cooperatives in the region are now defunct. A number of individuals explained that, even if they are able to take their case to court, an average case costs between INR10,000 (about €138 as at 2nd February 2013) and INR20,000 (€275), which is well beyond the scope of an average fisherman.

Salt farmers highlighted the fact that the de-siltation of the new canal – which was carried out in 2004 without proper stakeholder consultations – has resulted in loss of livelihoods of the salt farmers. However, grievance mechanisms for the affected communities to seek justice or compensation are lacking. Overall, compared with the larger and more organised fishing community, the smaller size and increased social marginalisation of salt farmers has meant that they are less inclined to protest to claim their perceived rights.

According to some respondents, the “mafia” who control *gheri* farming have arms and political protection. Fishermen explained that this deters them from physical confrontations; nevertheless, there have been a number of violent incidents over the past year, as documented by the local media.

## Wellbeing

Some respondents explained that the division between traditional fishermen and *gheri* farmers (non-traditional fishermen) was entrenched in caste relations, which would be very difficult to remove. Fishermen in our study sites are from specific fishing castes, within which there are sub-castes by area and different fish species. Fishing people feel that these social strictures are a barrier to alternative livelihood options. For example, no fishermen interviewed suggested agriculture as a means to supplement their income.

Fishing cooperatives give marginalised fishing communities (who are traditionally seen as a low caste) a stronger collective voice and thus scope to participate and be heard in local decision-making processes. Fishing cooperatives also give women an opportunity to participate, since men are often out at sea. About 30 percent of the fisher people’s forum in Rambha was female; moreover, the elected vice-president of Samudra, another cooperative in Satapada, was female. However, with the increased phenomenon of fishing cooperatives becoming defunct (according to fishing communities, due to elite capture, lack of resources and increased time pressure on women from fishing communities to work and thus limit their ability to attend meetings), this marginalised group have lost their organised, collective voice with which to lobby for change (for example, against zero-mesh nets). There is also less of an opportunity for this group to participate in decision-making processes that concern them, leaving them increasingly dislocated from political processes. The loss of cooperatives also limits opportunities for female voice and participation in decision making and local governance.

As a result of livelihood insecurity, more women stated that they are taking up work, while more men are reportedly migrating from Odisha to other parts of India for domestic work. While none of the respondents directly spoke about the impacts of these developments on wellbeing, key informants<sup>19</sup> noted that these shifts were creating dislocated family dynamics, with implications such as the spread of sexually transmitted diseases and the abandonment of wives.

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<sup>19</sup> Private conversation with Malini Mehra, 20th September 2012.

## 6. What are the likely new and future vulnerabilities?

Apart from more frequent extreme weather events such as floods and droughts, the large-scale impact of climate change is likely to include a rise in sea levels, causing economic loss and disruption of life. With sea level rise, many coastal systems are likely to experience increased levels of inundation and storm flooding, accelerated coastal erosion, seawater intrusion into fresh groundwater and encroachment of tidal waters into river systems. Deltas and low-lying coastal areas will be inundated by sea level rise. Increased rainfall during the monsoons will increase the frequency of floods, with areas already prone to floods likely to suffer more.<sup>20</sup>

Chilika Lake specifically faces the threat of ecosystem degradation as a result of *gheri* farming. *Gheri* farming involves the use of artificial sources of nutrients for prawn cultivation; these mix with the lake water, causing its pollution and also resulting in variations in the natural biodiversity of the lake system. In addition, the zero-mesh nets – the very tiny nylon nets required for *gheri* farming – trap nutrients required for young fish, affecting the livelihood of the local fishermen. Although the government has banned this practice, it continues as a result of bribery and politicisation, where the mafia is able to wield power and influence the government.

The long-term sustainable use of Chilika Lake through the promotion of responsible fisheries is another area of vulnerability. A wildlife conservation agent interviewed observed that the scale of fishing is increasing significantly as a result of the use of mechanised fishing trawlers, a rise in the number of fishermen and the use of unsustainable techniques (such as longer nets with smaller mesh, the catching of spawning fish and juvenile crabs, and fishing in the sea mouth that is resulting in the catching of migrating species). The natural breeding of fish that takes place in shallow waters is becoming an issue, as such waters are covered by *gheri* cultivation. The conservation agent clarified that, although there is regulation over fishing in the spawning season, there are no strong enforcement mechanisms of such regulations by the fisheries department. The lake system of Chilika is not only threatened by local factors, but also by practices upstream. One of the biggest risks identified by the wildlife conservation agent is the planned diversion of freshwater from the Mahanadi River, a major river system of Odisha, for the industrial purpose of the POSCO steel company. This would inevitably jeopardise the water availability of Chilika Lake and cause an irreversible change to the lake system. The conservation agent warned: ‘Water is going to be the biggest source of conflict in Chilika; the government has signed contracts with huge industries.’

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<sup>20</sup> Centre for Science and Environment (2001). Op. cit.

**Table: Climate change impacts and their implications for conflict drivers**

Climate/Environmental change impacts	Implications for existing conflict drivers/risks to peace
<p>Dwindling fish species due to increased salinity of the lake</p> <p>Increased salinity of the land surrounding Chilika Lake</p>	<ul style="list-style-type: none"> <li>• Traditional fishermen's livelihoods are affected, while shrimp farmers get more benefit out of the lake</li> <li>• Divisions between the poor/marginalised and the wealthy are reinforced and there is an increase in social hierarchies</li> <li>• With increases in salinity and shrimp farming, outside interest in the lake increases, reducing cooperative operation space (for fishing, shrimp farming) and increasing conflict over resources and fishing space</li> <li>• Traditional farmers who are out of work because of the increase in salinity either enter the middlemen business or migrate</li> </ul>
<p>Pollution in the lake results in a dwindling fish species (due to drainage, less fresh water from the river is feeding into the system)</p>	<ul style="list-style-type: none"> <li>• Livelihoods of the traditional fishermen as well as the shrimp farmers are affected, leading to conflict over existing resources of fishing territories and fish catch</li> </ul>
<p>Storms (cyclones) affect the lives and livelihoods of people dependent on Chilika Lake</p>	<ul style="list-style-type: none"> <li>• Fishermen are left to fend for themselves if there are storms while they are on the lake</li> <li>• Traditional places of shelter (small islands on the lake) are now protected areas, so the fishermen cannot access these places for shelter during storms, thus leading to loss of life</li> </ul>
<p>Maladaptation practices result in a loss of livelihood</p>	<ul style="list-style-type: none"> <li>• The lake opening caused a loss of livelihood for the salt farmers, increasing discontent over the governance mechanism for ensuring the livelihood option</li> <li>• Lack of coordination among a different governance mechanisms over the lake means that the fight over limited resources is not being properly managed; this is leading to increased impunity, decreased accountability and rising tensions among community members</li> </ul>



## 7. Are there observable constituent factors of resilience in this context?

### Migration

There is a significant trend of outmigration among men in Odisha, largely to work as labourers and domestic help in other states.<sup>21</sup> In order to cope with the loss of their livelihood, most of the salt farmers (over 70 percent) and some from the fishing community have migrated to work as labourers in other states. According to a former leader of the Chilika Bachao Andolan (CBA) group, people from fishing communities either commute to Bhubaneswar (the district capital) for daily labour work or to other cities such as Mumbai, Delhi and Surat. Fishermen from Arakhuda village in Satapada confirmed that many in their community were migrating to cities such as Mumbai and Surat, as their livelihood from fishing was under threat. In this village, there is also a rising trend of young people leaving the village in search of work, with some now working in prawn packaging factories. The vice-president of a fishing community federation mentioned that 500 people out of a total 3,000 members from his fishing federation have migrated to places such as Kolkata and Chennai, becoming daily wage earners. One respondent from the Samudra cooperative explained that migration has led to a “brain drain” from the community, resulting in knock-on consequences for community dynamics: ‘All those involved in administration and accounts have migrated, so the books are in a mess. There is nobody here who can manage our accounts.’

### Cooperatives

A large number of fishermen cited cooperatives as providing a useful mechanism to discuss their problems and organise solutions within the community. Cooperatives were seen as the first port of call to raise grievances and generally provided a space where problems would be mediated and resolved. Cooperatives would also represent community views to local government: for example, the Samudra cooperative actively lobbied the CDA to prevent the use of zero-mesh nets for the past four years. However, a number of respondents also referred to conflicts within the cooperatives – for instance, over allocation of resources, corruption and elite capture of power within certain cooperatives. Respondents noted that the president and vice-president of a local cooperative were not from the same community but rather “outside mafia”. According to one key informant, better governance and resourcing of cooperatives, including financial oversight, would

<sup>21</sup> Quoted by Malini Mehra from a discussion on the security challenges of climate change and migration at International Alert’s Peace Talks event at the Royal Commonwealth Club, 20th September 2012.

provide a mechanism for fishing communities to be represented against future external interventions (by the CDA) which might affect them. Cooperatives also help small-scale fishing communities in value chain addition activities, such as hygienic production of dried fish and fish pickle. In the absence of NGO activities in the area, cooperatives were a significant source of social capital for the fishing community.

## Loans

As fishing cooperatives have become more or less defunct, fishing communities have turned to the mafia to engage in prawn farming or are taking loans from middlemen to continue fishing. One respondent explained: ‘We now go through rich community members who give a guaranteed fish price.’ This dependency on middlemen and mafia, on the one hand, provides the necessary capital for fishermen to sustain their livelihoods and continue fishing; however, on the other hand, it makes them vulnerable to exploitation and undermines their capacity for resilience. As one respondent outlined: ‘We have to take a loan of 10,000 rupees for the boat for one day; then we are forced to sell fish catch for 30 rupees per kg.’ This tied loan means that fishermen cannot benefit from market prices; however, as they explained, they have no option but to take the money. A few respondents mentioned pressure from within their own community to take loans. One fisherman explained: ‘We have boats and nets but they are poor quality, so we are pushed to take loans by our own leaders who are involved in the loan process.’

## The Chilika Development Authority (CDA)

In principle, the CDA is responsible for the ecological, social and economic sustainability of Chilika Lake. This includes the lives and livelihoods of poor and marginalised communities who are dependent on the lake resources. In practice, community members did not feel that the CDA represented their needs or addressed their concerns. For example, fishing communities stated that they have campaigned against the use of zero-mesh nets and against *gheri* farming for years but feel that the CDA has ignored them. Salt farmers explained that an intervention by the CDA in 2004 to construct a new canal was entirely responsible for their loss of livelihood. According to community respondents, the key problems with the CDA are that it does not have sufficient authority to enforce regulations and that it has primarily engaged in engineering solutions without consultation or considering the social impacts. However, a small minority of respondents did note that the body’s existence provides an opportunity to promote better governance of the lake’s resources in the future.

## 8. How does the national political context affect resilience?

The National Action Plan on Climate Change (NAPCC, 2008) recognises that, in order to deal with the challenge of climate change, a comprehensive approach needs to be taken, acting on several fronts simultaneously (IDS, 2010). Eight priority National Missions form the core of the NAPCC, which will promote understanding of climate change, adaptation and mitigation, energy efficiency and natural resource conservation. These priority areas include solar energy, enhanced energy efficiency, a sustainable habitat, water conservation, sustaining the Himalayan ecosystem, a “Green India”, sustainable agriculture and a strategic knowledge platform for climate change. The states are also navigating in this policy direction through state specific plans called the State Action Plan on Climate Change (SAPCC). Although these state plans are guided by a national-level framework, they are an outcome of context-specific risks, vulnerabilities and emerging opportunities.

According to a key informant from The Energy and Resources Institute (TERI), there are questions of accountability in the implementation of these policies. Based on key informant interviews and desk research, there is no definition of targets, timelines, financial implications or funding sources. Furthermore, synergies between the objectives and the goals of the NAPCC are not clear. Climate change is not a subject that can be addressed in isolation by one department; it requires active inter-departmental cooperation. Generally, the preparation of SAPCCs in India has witnessed line departments providing primary inputs to the nodal department, which in consultation with technical experts has sought to develop a coherent policy document. Cross-department integration of strategies has been attempted in varying ways: while in some states presentation of the SAPCC before a high-level Committee of Secretaries has enabled quick iteration and consensus building, in others the process has been tedious and often superficial.<sup>22</sup>

The current planning processes in India for climate response are observed as having a mandate for the participation of different stakeholders, although the type, degree and efficacy of the consultative processes remain unknown. While the policy goals have moved towards cross-sectoral issues, the governance institutions are still working with a reductionist paradigm, managing the functions of their own sectors. Desk research and key informant interviews in Delhi indicate that there is poor coherence between the sustainable development discourse, the institutional framework of the executive of India’s multi-level governance system and the ongoing planning processes.

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<sup>22</sup> A. Mishra et al (2011). *Sub-national actions on climate change in India and implications for international collaboration*. Paper for the 17th Conference of Parties to the United Nations Framework Convention on Climate Change, 28th November–9th December 2011, Durban, South Africa.

## 9. How do external interventions affect resilience factors?

### Commercial prawn farming and the involvement of TATA

The entry of TATA, an Indian multinational company, in Chilika is a good example of how a conflict-insensitive intervention can trigger conflict and how it can inadvertently divide communities as well as disrupt the existing social order. In the early 1990s, the government of Odisha granted legal permission to TATA to carry out commercial prawn farming in 14,000 acres of Chilika Lake for export purposes in order to increase revenues. Communities of all castes and classes set aside their differences and successfully demonstrated against the project, forcing TATA to withdraw from Chilika. The demonstration, popularly known as the CBA, severely tainted the reputation of TATA. However, different community groups who stood united against a common enemy, TATA, have been in conflict ever since. This is because outsiders such as non-fishermen – realising that higher gains could be made from the newly introduced technology, namely prawn farming – started to claim a stake in the lake, to the detriment of local fishing communities.

### The CDA and the new lake mouth

The CDA was established in November 1991 under the Forest and Environment Department of Odisha – the state regulatory authority for dealing with issues related to coastal zone management. It was created as an autonomous agency with the objectives of lake management and ecological restoration. No department including the CDA has any legal power to enforce measures for the protection of the resources or to apprehend in case of violation of rules and regulations. As such, the CDA is seen to be toothless.

In 2004, the CDA carried out an intervention that was considered to be hugely successful in terms of biodiversity restoration of the lake. It engineered a new opening and canal, deeper than the Saheb canal, to allow water to flow from the new opening. According to the local CDA officials, the new opening had to be created because siltation in the old one was affecting the lake's biodiversity. However, this intervention led to the loss of salt farmers' livelihood, as it diverted water flow from the Saheb canal that flowed to salt farmers' fields. Moreover, the fishing communities feel that the opening of the mouth has facilitated the escape of fish to the sea, resulting in reduced fish stock in the lake.

## Integrated Coastal Zone Management

The Integrated Coastal Zone Management (ICZM) project, funded by the World Bank, is planned to develop all sectoral activities that affect coasts and its resources. It aims to check coastal erosion, promote eco-tourism, ensure livelihood security of coastal fishermen and help the conservation of biodiversity.<sup>23</sup> The project envisages the creation of direct employment opportunities for the coastal communities through eco-tourism activities.<sup>24</sup>

The ICZM project aims to give all powers of management, implementation and monitoring of the project to one agency – the CDA. As the key agency, the CDA can play an important role in the socio-economic development of the area and the local communities by working closely with them in decision making and enforcement of conflict-sensitive ICZM policies – that is, policies that facilitate livelihood security through financial assistance, as well as enabling the exploration of other viable livelihood options through training and organising the market for the communities and cooperatives.

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23 See: [http://www.iczmpodisha.org/aim\\_and\\_objective.htm](http://www.iczmpodisha.org/aim_and_objective.htm)

24 CDA, Integrated Coastal Zone Management Project.

## 10. What are the constraints on effective governance at the local level?

### Issues around the implementation of the State Climate Change Action Plan (CCAP)

Odisha's CCAP approaches the problem of climate change as a risk to the ongoing economic growth of the state and as a poverty multiplier. According to local government officials, 'the CCAP Odisha is not only a response to the government's call, but also reflects the urgency to deal with pressing issues in a state whose economy is being crippled by recurring droughts, floods and cyclones'. The underlying rationale behind the CCAP is to help Odisha move towards a carbon-conscious, climate resilient development path.<sup>25</sup> The action plan has validated 287 priority actions in 11 sectors – namely, agriculture, coastal zones and disasters, energy, fisheries and animal resources, forestry, health, industry, mining, transport, urban planning and water resources.

However, a number of key informants stated that issues still remain regarding the appropriate mainstreaming of climate responses and development action. For example, while thermal energy aggravates climate risks to water resource availability and accessibility,<sup>26</sup> the importance of coal-based rapid industrialisation – particularly through large extractive industries and thermal power generation – to the Odisha economy overrides the concern regarding climate risks. The risk of this type of industrialisation is increased by the government of India's decision to accord Special Economic Zone (SEZ)<sup>27</sup> status to eight sites in the coastal region of Odisha. According to community respondents, there is increasing conflict in the form of resistance and opposition to these projects from the local population, who find their livelihoods threatened by uncontrolled commercial development leading to pollution, siltation, erosion, salt water intrusion, flooding, etc. Fishermen from Satapada and respondents from the Fisher People's Forum stated that they felt angry because they were not consulted by decision makers.

25 IDS (2010). Op. cit.

26 Prime Minister's Council on Climate Change, Government of India (2008). Op. cit.

27 A Special Economic Zone (SEZ) is a geographical region that benefits from more liberal economic laws than those that prevail in the rest of the country. They are created by countries to attract foreign direct investment, in order to stimulate rapid, export-led industrial growth. In India, SEZs are areas declared as quasi-foreign territory, where raw materials and capital goods can be imported duty free from abroad or the domestic market.

## The political economy of *gheri* farming

A major concern raised by almost all respondents (over 84 percent) from the fishing and salt farming community was the power held by the “mafia” – in particular, the mafia’s control of the lake resources and the political and police protection granted to these individuals. Grievances raised by respondents were due both to the livelihood limitations this posed to local fishermen and the increased sense of marginalisation they felt as a result of sub-leasing their land or working for the mafia. Thus, implementation of climate change adaptation activities – for example under the state plan – in these communities (by the CDA or other actors) needs to be sensitive to the political economy of resource allocation and the social dynamics at play.

## Lack of clarity around the roles and responsibilities of governance bodies

There is an absence of a regulatory mechanism and a clear decision-making structure for the lake. Different authorities are responsible for managing different aspects of the lake and its resources, and there is no single agency responsible for the lake as a whole.

## 11. How can resilience be strengthened?

Findings from this study point to the following as key priority areas for building the resilience of vulnerable communities dependent on the resources of Chilika Lake.

### Effective governance

A comprehensive lake management policy promoting the overall development of Chilika that supports regulations and enforcement is the overriding prerequisite for effective management and equitable distribution of the lake resources. The lake has to be viewed in totality, and policies for the lake should address the social interest along with conservation and commercial interest. For effective governance, decisions, policies and interventions with respect to the lake should include all stakeholders. Natural resource governance cannot be carried out without taking into consideration the needs of the local communities, especially when their socio-economic situation is directly tied to natural resources.

A former leader of the CBA group firmly believes that the government has to intervene with strong legislation to protect the rights of the traditional fishing communities.

International agencies supporting ecosystem conservation and climate change research and impacts should broaden their focus – that is, from ecology restoration and disaster risk-reduction programmes to building capacity for natural resource governance and compliance with both social and environmental regulations.

### Availability of credit

All respondents from the fishing community interviewed stated that accountable and accessible credit was one of the top three changes that would make their lives more resilient to future risks. According to one respondent from the Samudra fishing cooperative: ‘If formal credit mechanisms were put in place at the local level and loans made available to the fishing communities on soft terms for their basic capital requirements, namely the purchase of boats, nets and other fishing equipment, this would reduce their dependency on middlemen and the mafia.’

Concerns were raised regarding the existing micro-finance initiatives, as they are considered to be corrupt and fraudulent. According to the Secretary of the Wildlife Conservation, ‘there is an absence of credit mechanisms. Micro-finance is a big racket in the state. They have been responsible for farmers’ suicides. Recovery mechanisms



are very cruel and can lead to social ostracisation and humiliation.’ Another key informant, the president of a cooperative in Arakhuda village, spoke of how a local micro-credit organisation had collected money from the villagers and absconded.

Historically, fishing cooperatives and salt farmers’ associations played an important role in facilitating credit and loan availability to the communities. Before the entry of prawn farming, they were responsible for the socio-economic wellbeing of fishermen and salt farmers. They provided capital, allocated leases and promoted the rights of their members. However, due to a lack of resources and capacity, the cooperatives are currently involved in facilitating local fishermen to sub-lease their fishing grounds to mafia and other middlemen. Fishing people from Rambha town in the Ganjam district confirmed this in a focus group. They revealed that they are forced to give up their fishing rights, i.e. to sub-let or lease their fishing, as their cooperative is in financial difficulty and a sub-lease means immediate financial gains to remedy their impoverishment. If they had access to capital, loans or cash for investment in boats and other equipment, they would not sub-lease.

### Alternative livelihoods

Although the issue of changing jobs was not raised by many respondents from the fishing community, this was a greater concern for the salt farmers as well as key informants from local government and NGOs. According to the head of the CDA, ‘In the face of climate change, there is a serious need to diversify livelihood options to ones that are not directly dependent on the lake.’ However, fishing communities felt tied to fishing for reasons of tradition and caste. Respondents from the fishing cooperatives explained that the best options to support alternative livelihoods for fishing communities would be through creating links for fishermen to the entire fishing industry, including export markets, and through promoting value chain addition activities. Authorities such as the CDA could facilitate market linkages and provide training in areas such as fish processing and marketing (packaging and labelling) to enable communities to sell their produce at a higher price. Salt farmers highlighted challenges around lack of access to markets and insufficient capital to increase the quality of their product to sell to commercial buyers at a higher price. Although they were producing salt and there was a salt production factory within 15 kilometres of them, they were unable to sell their raw materials to the factory as it was not sufficiently pure. One salt farmer explained: ‘We would like to make the salt refined and better packaged so that we can sell to the factory and to shops in Bhubaneswar and Delhi, instead of only at the local market for a very low price.’

Alternative livelihoods such as crab fishing and poultry farming are being carried out on a small scale in some pockets of the area. There is also increasing interest

among young people to engage in these occupations. The potential for new businesses such as small-scale retail shops also exists. However, at present, there is a lack of capital investment to promote this. The authorities could explore the potential of these small-scale industries and the feasibility of promoting them.

A sizeable amount of resources are being channelled into the management of Chilika Lake under the ICZM scheme. These funds could be operationalized to design alternative livelihoods after taking into account the socio-economic context of the area.



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