

CESS MONOGRAPHS
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32

Visualising resources on Gandhamardhan Hill

Mapping revenue and forest land in Bargarh District of Western
Odisha for improved community rights

Patrik Oskarsson



RESEARCH UNIT FOR LIVELIHOODS AND NATURAL RESOURCES
(Supported by Jamsetji Tata Trust)



CENTRE FOR ECONOMIC AND SOCIAL STUDIES

Begumpet, Hyderabad-500016

November, 2013

CENTRE FOR ECONOMIC AND SOCIAL STUDIES MONOGRAPH SERIES

Number - 32

November, 2013

Series Editor : M. Gopinath Reddy

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Centre for Economic and Social Studies
Hyderabad

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Rs. 200/-

Published by :
Centre for Economic and Social Studies
Begumpet, Hyderabad-500 016
Ph : 040-23402789, 23416780, Fax : 040-23406808
Email : post@cess.ac.in, www.cess.ac.in

Printed by :
Vidya Graphics
1-8-724/33, Padma Colony,
Nallakunta, Hyderabad - 44

Foreword

The Centre for Economic and Social Studies (CESS) was established in 1980 to undertake research in the field of economic and social development in India. The Centre recognizes that a comprehensive study of economic and social development issues requires an interdisciplinary approach and tries to involve researchers from various disciplines. The Centre's focus has been on policy relevant research through empirical investigation with sound methodology. Being a Hyderabad based think tank, it has focused on, among other things, several distinctive features of the development process of Andhra Pradesh, though its sphere of research activities has expanded beyond the state, covering other states apart from issues at the nation level.

In keeping with the interests of the faculty, CESS has developed expertise on several themes which included, among others, growth, equity, rural development, poverty, agriculture, food security, irrigation, water management, public finance, health, and environment. It is important to recognize the need to reorient the priorities of research taking into account the contemporary and emerging problems. Social science research needs to respond to the challenges posed by the shifts in the development paradigms like economic reforms and globalization as well as emerging issues such as optimal use of environmental and natural resources, role of new technology, and inclusive growth.

Dissemination of research findings to fellow researchers and policy thinkers is an important dimension of policy relevant research which directly or indirectly contributes to policy formulation and evaluation. CESS has published several books, journal articles, working papers and monographs over the years. The monographs are basically research studies and project reports done at the Centre. They provide an opportunity for CESS faculty, visiting scholars and students to disseminate their research findings in an elaborate form.

This monograph by Patrik Oskarsson presents the results of an exploratory study on "Visualising resources on Gandhamardhan Hill: Mapping revenue and forest land in Bargarh District of Western Odisha for improved community rights" carried out in collaboration with the NGO Vasundhara based in Bhubaneswar. This report has discussed community mapping of natural resources based on a case study at Gandhamardhan Hill in Western Odisha. In this exploratory study an attempt was made to capture the many different livelihood and cultural uses of resources which at present go undetected either due to outdated land records on revenue land, or based on a denial of rights to forests. The increasing availability of low(er) cost GIS technologies were here put to use to enable the creation of improved maps. In the project ethnographic methods and GIS techniques were combined to create a detailed set of maps of how resources are used in one part of Gandhamardhan Hill at present. The project particularly aimed to find the gaps between the official and actual uses of land in the area as a way of understanding how maps might be useful.

Mapping of natural resource uses can serve many purposes beneficial to local livelihoods. It can provide detailed evidence of peoples' use of forests which can allow claims according to the Forest Rights Act. They can be used to settle revenue land in favour of local cultivators. And they can be used to convince government expert committees and other planning bodies that mining plans has to be reconsidered given the risk of disrupting livelihoods and valuable environments. Another possibility is to use the maps in public interest litigation. For these promises to be realised it is however crucial to have an active involvement of communities, or at the very least their representatives. If local participation is not part of the mapping exercise local advocacy efforts with revenue and forest departments will fall short and there is a likeliness that various elites will continue to own and use a disproportionate share of the natural resource base.

The project was able to access the revenue maps which though outdated from the late 1970s formed an important picture of how present rights are settled in the study villages. The maps were digitised and updated with present land uses. This showed as expected that agricultural plots in all the study villages had not been recorded leaving the cultivators without legal rights to face many penalties from the Revenue Department. The maps also show how Irrigation and Forest Department structures has been established in several villages with possible benefits for the villages but also involving a loss of unrecorded agricultural fields without compensation for the farmers who used to cultivate those areas. Most peculiar of all was one large plot of land in a study village which officially did not belong to revenue or forest department. The cultivators on this land could thus not approach neither Revenue nor Forest Department officials to have their fields regularized leaving them in a limbo. In sum, the revenue land cadastral maps were able to detail with good precision a large number of discrepancies between the official map and the actual land uses. Further studies are recommended to understand to what extent other areas have similar problems and how farmers might be able to regularise their plots.

I sincerely hope that the maps created by this project should give scope for demands to recognise cultivation on revenue land and forest rights both in the village and the reserve forests based on a wide number of uses acknowledged in the Forest Rights Act of 2006. It is likely that the maps produced by this project will be more useful as evidence of some of the possibilities afforded by mapping techniques and in higher-level advocacy. I have no doubt that this monograph with all its technical details using GIS technology will be useful to revenue and forest departments beside civil society bodies engaged in strengthening the implementation of Forest Right Act 2006 in Odisha.

S Galab

Director, CESS

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Acknowledgements

The idea to map forests and farm lands for improved community rights grew out of my PhD research 2005-2010 into proposed bauxite mining. During this and subsequent work it became all too clear that a part of why adivasis are always losing out when mining is proposed is that their rights to land and forests have never been properly recognised. While strong land rights have existed for a long time without adequate implementation new hope has come in the form of the Forest Rights Act which allows traditionally forest-dwelling communities to claim individual and community reserves. The government has a number of maps at its disposal but these are kept away from wider civil society and do not show actual resource uses since they are out of date and based on government preferences rather than those of marginal farmers.

The question is then of course how to be able to make use of the existing legislation? One possibility is that which has been used here, to explore how mapmaking can be used as a tool for improved rights to resources. When my own interest in maps was more than matched by the enthusiasm of Himansu Patra at Vasundhara in Bhubaneswar, Orissa which opened up for a possible collaboration. I was then fortunate to meet Dr M. Gopinath Reddy in Hyderabad and find him interested in collaborating on this project, the support is hereby gratefully acknowledged. The project was also fortunate to have Prof Desai of the RULNR Board attend the inception workshop in October 2011.

Fieldwork for the project was carried out in collaboration with Vasundhara in Bargarh District of Odisha. Initial project discussions and a scoping trip came into reality much due to the collaboration with Himansu Patra who later decided to look for employment opportunities elsewhere and therefore could not be part of the main fieldwork and later analysis. Throughout the project, and as part of the scoping trip, Madhu Sarin's vast experience of forests and forest livelihoods has been much appreciated. Thanks also to Y. Giri Rao and the rest of the Vasundhara team for ensuring that the project and all its workers had the necessary support.

During three fieldwork trips to Bargarh District during late 2011 and early 2012 Sudhanshu Behera, Tarun Pradhan, Usha Kiran Baa and Bulu Behera worked tirelessly to complete interviews, walking tours and surveys. Many thanks for their support and sincere commitment. Tarun together with Swapneswar Dehury used the collected data

and produced superb maps once fieldwork was completed. Many local insights were also gained with the help of CCD (Covenant Centre for Development) and the Gandhamardhan Suraksha Yuva Parishad during fieldwork which needs to be acknowledged.

A final thanks go to the villagers of Bargarh District who were able to take time from their everyday activities to discuss their lives with the project team, and additionally helped to interpret maps and find the few remaining village boundary markers that we needed for our map-making in an area much neglected by its government.

Patrik Oskarsson
poskar@gmail.com

Glossary and abbreviations

Cadastral map	Map showing plots on revenue land. Also known as survey map
GIS	Geographical Information Systems
GPS	Global Positioning System; a navigation system which relies on US communication satellites to determine location
Gochar	Grazing land within a revenue village. Also known as goucher.
Khata	Plot
Khata Number	Unique serial number assigned to land owners at Village. Also known as survey number
Khatian/Khatiyan	An individual ROR
MoEF	Ministry of Environment and Forests of the central government
Mutation	Transfer of ownership
NTFP	Non-Timber Forest Produce
OSATIP	Orissa Scheduled Areas Transfer of Immovable Property (Scheduled Tribes) Regulation, 1956 as amended up to 2002
PESA	Panchayat Extension to Scheduled Areas Act, an act to modify and implement local self governance in the Scheduled Areas across India
ROR	Record of Rights, also known as 'khatauni'. Records the names and classes of tenure of all occupants of land
Survey Number	Unique number assigned to each piece of land at Village Level
Trishumali	The meeting point of three different revenue villages

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Summary

This monograph presents the results of an exploratory study carried out in collaboration with the NGO Vasundhara based in Bhubaneswar. In this project livelihoods analysis and mapmaking technologies have been used to explore to what extent international experiences of participatory mapping can be used in India to support local resource rights. Gandhamardhan Hill in Bargarh and Bolangir Districts of Odisha was chosen as the field area due to the existence of bauxite ore which from time to time has been proposed to be mined with unknown consequences for local people. The Hill is also a good case study since it has high biodiversity with good forest cover, a large adivasi population and many spiritual uses which continue to attract large numbers of local and far away visitors.

Mapping of natural resource uses can serve many purposes beneficial to local livelihoods. It can provide detailed evidence of peoples' use of forests which can allow claims according to the Forest Rights Act. They can be used to settle revenue land in favour of local cultivators. And they can be used to convince government expert committees and other planning bodies that mining plans has to be reconsidered given the risk of disrupting livelihoods and valuable environments. Another possibility is to use the maps in public interest litigation. For these promises to be realised it is however crucial to have an active involvement of communities, or at the very least their representatives. If local participation is not part of the mapping exercise local advocacy efforts with revenue and forest departments will fall short and there is a likeliness that various elites will continue to own and use a disproportionate share of the natural resource base.

The project was able to access the revenue maps which though outdated from the late 1970s formed an important picture of how present rights are settled in the study villages. The maps were digitised and updated with present land uses. This showed as expected that agricultural plots in all the study villages had not been recorded leaving the cultivators without legal rights to face many penalties from the Revenue Department. The maps also show how Irrigation and Forest Department structures has been established in several villages with possible benefits for the villages but also involving a loss of unrecorded agricultural fields without compensation for the farmers who used to cultivate those areas. Most peculiar of all was one large plot of land in a study village which officially did not belong to revenue or forest department. The cultivators on this land could thus not

approach neither Revenue nor Forest Department officials to have their fields regularised leaving them in a limbo. In sum, the revenue land cadastral maps were able to detail with good precision a large number of discrepancies between the official map and the actual land uses. Further studies are recommended to understand to what extent other areas have similar problems and how farmers might be able to regularise their plots.

The well-known high biodiversity and excellent forest cover of Gandhamardhan Hill has given rise to a wide number of uses of the forest. This was evident in this study both in village forest on revenue land and in the larger reserve forest. Not surprisingly the forest was particularly important in the hot summer months when water scarcity prevents cultivation. The project was unable to access forest maps which are similarly detailed to those of the revenue land but could nevertheless show a wide number of uses of the forest including spiritual uses, and the collection of NTFP, bamboo, medicinal plants and firewood all the way to the top of the Hill. It is thus clear that people depend on large areas including those where the bauxite ore exists on the very top.

The maps created by this project should give scope for demands to recognise cultivation on revenue land and forest rights both in the village and the reserve forests based on a wide number of uses acknowledged in the Forest Rights Act of 2006. To actually make use of existing rights might be a challenge however given the widespread poverty in the area and the poor agricultural facilities where only very few have access to irrigation and transport of produce is a real challenge. Improved tenure rights will certainly be good for farmers but are at present not expected to be able to on their own radically improve the agricultural opportunities in the area. A strong local movement, the Gandhamardhan Suraksha Yuba Parishad, continues to exist since the 1980s anti-bauxite mining protests all around the Hill however and could possibly come to be the focal point of a new movement which aims to secure the livelihood and spiritual rights of villagers to the Hill. Before mobilization and awareness raising campaigns can be organised locally it is likely that the maps produced by this project will be more useful as evidence of some of the possibilities afforded by mapping techniques and in higher-level advocacy.

I INTRODUCTION

Internationally a lot of work has gone into designing manuals and other accessible, yet comprehensive, documents of how to carry out land use mapping in particular contexts, for example in relation to the lands of indigenous peoples in Canada (Tobias, 2009, 2000), or in relation to particular kinds of resource uses. Common features for such mapping frameworks are firstly that they should include, and preferably be carried out, by the affected communities themselves in order to truly represent their interests. This is since traditionally mapping has tended to be carried out on behalf of the state or some other outside authority thereby inducing outcomes towards goals set by this organisation rather than those living on and making use of the land. Secondly, tools and techniques should be feasible. This means any methodology should not be overly complicated and require specialist knowledge or expensive equipment. This might imply a trade-off between precision, affordability and ease-of-use. Increasingly however the precision and affordability of commonly available tools ensures that maps of very good quality can be produced.

Mapping of natural resource uses can serve many purposes beneficial to local livelihoods. It can provide detailed evidence of peoples' use of forests which can allow claims according to the Forest Rights Act. They can be used to settle revenue land in favour of local cultivators. And they can be used to convince expert committees and other planning bodies that mining plans has to be reconsidered given the risk of disrupting livelihoods, as well as be used in litigation. For these promises to be realised it is however crucial to have an active involvement of communities, or at the very least their representatives. If local participation is not part of the mapping exercise there is a likeliness that various elites will continue to own and use a disproportionate share of the natural resource base.

This monograph presents the results of an exploratory project carried out in collaboration with the NGO Vasundhara based in Bhubaneswar. In this project livelihoods analysis

and mapmaking have been used to see to what extent international experiences of participatory mapping can be used in India to support local resource rights. Gandhamardhan Hill was chosen as the field area due to the existence of bauxite ore which from time to time has been proposed to be mined with unknown consequences for local people. The Hill is also a good case study since it has high biodiversity with good forest cover, a large adivasi population and many spiritual uses which continue to attract large numbers of local and far away visitors.

This chapter provides the background to the project, its objectives and research questions. In chapter two the context of the study area is discussed. Chapter three provides details about land and forest uses and what livelihoods exist in the study area. In Chapter four mapmaking is combined with the earlier discussed ethnographic work. Chapter five, finally, presents the overall conclusions.

Background to project

The physical and social changes brought on by mining across central India have received increasing attention from civil society in recent years (Bhushan and Zeya Hazra, 2008; Kalshian, 2007; Oskarsson, 2010; Padel and Das, 2010). Social movements and activists have increasingly noted the threats posed by mining, and have been empowered by new legislation, especially the Forest Rights Act 2006, which allows for alternative resource claims to mineral extraction plans. But despite the struggle for pro-poor land rights as well as demands for recognition of community forest uses having a long history in central India with demands made both against the state and local elites, so far there has been very little research done to document spatially the many existing uses of land proposed for, and possibly at a later stage converted to, a mine. These changes are particularly interesting to document not only due to the private industry-lead expansion of mining but also given the new Forest Rights Act which allows previously excluded forest-dwellers to claim titles to land and forests officially classified as forest but used by the communities for generations. New possibilities afforded by modern information technology, specifically Geographical Information Systems (GIS), has the potential to produce maps of better quality than what was previously possible. These technologies can be used not only by expert geographers, but also by civil society actors in cooperation with affected communities themselves.

Bauxite mining can be a particularly useful form of mining to study not only since the ore bodies are all located in tribal areas with considerable biodiversity, but also for the many opposition movements which have objected to such projects including for example those in Kshipur and Niyamgiri in Odisha (formerly known as Orissa) and Jerrela and

Araku in Andhra Pradesh in recent years (Amnesty International, 2010; Oskarsson, 2010; Reddy, 2006; Supreme Court of India, 2008). The very first anti-bauxite movement in India was the one at Gandhamardhan Hill (Concerned Scholars, n.d.; Mishra, 1987) and since mining plans continue to threaten the Hill the movement remains active. The need for support for local communities in their land and forest claims against a rapidly expanding mineral industry, and the new opportunities afforded by legislation (especially the Forest Rights Act) and technology (known as Geographical Information Systems, GIS) indicate a good potential for social action research aimed at empowering marginalised communities by strengthening their rights to vital natural resources.

Maps can support livelihoods directly by visualising the existing uses of natural resources by local people thereby helping to prevent their displacement by for example mining or forest plantations without their consent or compensation. This is currently taking place far too often across the country when forest-dwellers are seen as 'encroachers' on forest land¹. The maps can also help communities claim recognition of their forest rights as well as counter the official mining plans which tend to hide local resource uses. Securing property rights via the formal recognition of land titles (and forest rights) is seen as one of the best ways to improve the livelihoods of poor people (Besley and Burgess, 2000).

Objectives

This project is an exploratory study of how local natural resource rights can be strengthened by the use of GIS technologies and map-making. Maps can potentially both be used in advocacy at the local level and in state and national government committees. The project therefore aims to collaborate with local people and groups thereby adding a participatory dimension to the research as well as produce maps which could be used for policy advocacy with the bureaucrats or in courts.

Research questions

The research questions in the original project proposal were:

- a) How can evolving technologies in GIS help support local resource struggles via the creation of maps?

¹ The general risks of displacement have been documented in for example Fernandes (2009). For displacement risks and livelihood impact directly related to bauxite mining see Reddy *et al.* (2010) and Oskarsson (2010).

- b) In which ways might participatory mapping improve local knowledge of resources and resource use thereby strengthening rights claims? What are the technical, financial and other limitations to the usefulness of such maps at the moment?
- c) How can maps be put to use as part of challenges to large-scale mining plans, especially the different clearances, e.g. environmental clearance or forest clearance, and in different courts? Is it possible to create maps which adhere to regulatory requirements and are of equal or better technical quality compared to those currently used in official planning documents like EIAs and Mining Plans?

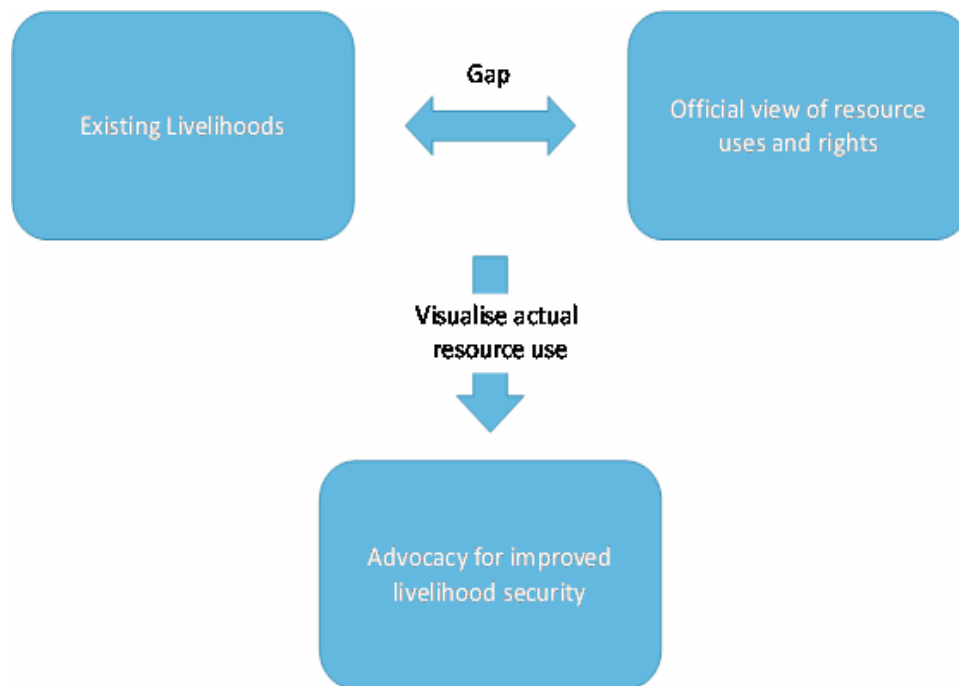
With this background in mind the present project was started in late 2011 to look into the possibilities to use GIS techniques and participatory methods in a case study of resource uses at Gandhamardhan hill in Western Odisha. A scoping visit and two fieldwork trips have been undertaken as part of the project which has included community interactions and measurement of locations using GPS devices.

A separate Working Paper, Oskarsson (2012), was produced as part of this project to answer research question b) above. In the Working Paper a detailed methodology of mapping was designed in order to provide not only useful results for the purposes mentioned above but also to be feasible for often resource-constrained community organisations. Rather than repeating the methodological details this Monograph will refer to the Working Paper beyond basic information about how the project was carried out.

Conceptual framework

This study has attempted to understand the gaps between actual natural resource uses as they exist in the study villages next to Gandhamardhan Hill with the official view of revenue land and forests which continue to inform laws. The approach chosen here has been to visualise the present resource uses via maps to make the difference between the actual and the official position on resource uses clear. By using maps as evidence for actual resource uses advocacy can take place for improved livelihood security. The below figure illustrates the conceptual framework.

Figure 1: Framework for mapping of natural resource uses



Rural livelihoods² analysis attempts to answer what resources exist and how they can be put into productive use. For livelihoods this tend to mean what assets exist and capabilities do people have which allows them to make use of those assets. This analysis needs to be set in the particular settings in the study area to understand the specificities of the area and the peoples. There is also a need to interrogate the unity of each village to understand which groups control certain resources and which do not. Important criteria include caste, class and gender dimensions of natural resource uses and livelihoods.

In tribal, central India, though alienation of the best agricultural land has been a serious issue in certain areas, access to land has often been a somewhat less important issue with average land holding size larger than the Indian average. Instead infertile soils, a lack of agricultural inputs, and poor infrastructure including a lack of irrigation facilities have

² "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Scoones, 1998)." Livelihoods should here be understood broadly as the material and cultural aspects of life in the study villages.

been among the reasons for low productivity (International Fund for Agriculture Development, 1991; Purushothaman, 2005). When settled agriculture has not been sufficient the commons, and especially forest lands, have been an important additional resource (Mearns, 1999). It is thus expected that the forests of Gandhamardhan Hill will be an important part of livelihoods, but also of spiritual and social life.

The official view of resource rights and what uses should exist is often dramatically different from the local perspective and builds on a colonial, historical legacy of land and forest settlements which only to a limited extent has been updated in recent decades. Private landholdings and forest use rights are still frequently denied to tribal and other groups of farmers greatly affecting livelihood outcomes:

Because tribals have no security of tenure and live under the constant threat of eviction, they cannot invest in improving their land. Their poverty prevents them from planting tree crops that have long gestation periods, and the illegality of their position precludes their receiving loans from the government to make their agriculture more productive (Baviskar, 1994).

The official view tends to be recorded in land records, maps and other documents handled by bureaucratic specialists without cultivators and forest product collectors being aware of their details. This world is closely guarded from outside view particularly by officers in the Revenue and Forest Departments of the state government since they are the people in local offices who know about local details. When local people have no input into how their resources are framed in official records this opens up for administrative or political misuse for the benefit of various vested interests ranging from locally influential groups to commercial and political groups.

The official view is also dressed up in a complicated techno-bureaucratic language difficult to comprehend for non-specialists. One example of this is how vital revenue maps rely on boundary markers with special codes which can only be understood with certain training. For these reasons local people, and particularly the poorest who tend to be less educated, have tended to become dependent on the goodwill of administrators for implementation of rights.

Transparency is however increasing particularly due to the Right to Information Act 2005 but also via the use of websites and other means of information dissemination. Even though direct interactions with the bureaucracy continue to be difficult it is possible to access much of the data used for official decision-making nowadays. There are thus a

number of possibilities afforded by legislation and long-running campaigns which can help bridge the gap between local livelihoods and official views of natural resources. Here the use of GIS technology is examined as a tool to help further narrow the gap.

The purpose of visualising resources is here explicitly action-oriented in that it aims to support *advocacy work for local livelihood improvements*. This approach has been chosen in recognition of the possibilities which exist for people to demand justice as equal citizens rather than having to depend on governments which have for many decades now failed to more than marginally improve overall conditions. Advocacy may be local when claiming forest rights or at a higher level in relation to administrative approvals or court cases depending on strategic choices which need to be made depending on the circumstances.

Methodology

In order to understand not only community land use but also which groups specifically use different resources, extensive ethnographic fieldwork was proposed in combination with mapmaking. The ethnographic work was partially seen as helping to identify important resources and resource users in the studied villages, and partially improving the interpretation of the completed maps in their variations across time and space. Since the combined methods used for this research has already been described in detailed in (2012) a summary will be provided here.

In the research team some of the members had previous experience of mapmaking and others had knowledge of livelihood analysis. The attempt was to make these different skill sets work together to achieve an integrated approach where maps were made which could be interpreted as valid representations of how the community as a whole and different groups use resources.

Site selection and sampling

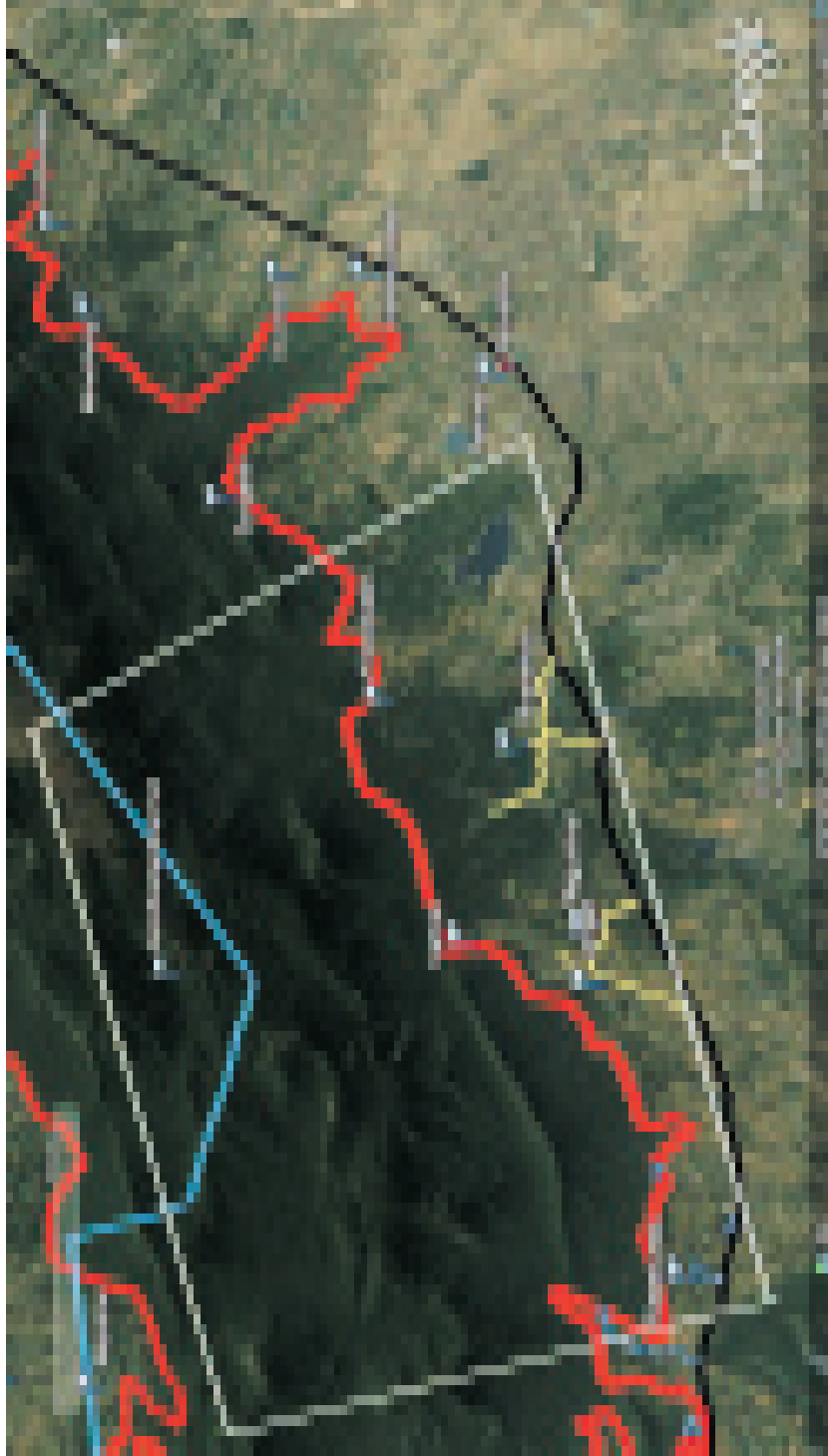
To select a study area which is not too large but still contains a good amount of variety in terms of social groups and their livelihoods was one of the most important tasks for the scoping trip and subsequent information-gathering activities. Local contacts were made during the scoping trip with the GSYF (Gandhamardhan Suraksha Yuva Parishad), a local movement which works to protect the hill and support livelihoods, and CCD, a Tamil Nadu NGO which is working on medicinal plants in the area. Local support was agreed on from both the organisations. CCD was able to provide one staff member to work on the project as a research assistant.

Available statistics and local interviews led the project team to consider a study close to Paikmal town in Bargarh District. When making the final selection of villages the following criteria were used:

- Most villages are mixed in the area with ST, SC and OBC communities. There appears to be no one caste village.
- There appears to be no forest villages (meaning that all villages are on revenue land) in the area but a good amount of forest as well as revenue land remains unsettled.
- Biodiversity seems to be good all around the hill
- There are plenty of streams of water, permanent and temporary, and smaller irrigation dams.
- The bauxite area next to Paikmal is part of what is being claimed by the Canadian company Balaton Power (via its subsidiary Continental Resources) and gives us a good understanding of the bauxite deposit via a report published by the company.
- The security situation is supposed to be good on the Bargarh side of the hill where Paikmal is located

Interactions also lead to the decision to locate the study area to a set of villages east of Paikmal in Bargarh district. Paikmal town was excluded since it was seen as depending too heavily on visitors to the local temple to be really representative of how most people around Gandhamardhan depend on resources on and around the hill. The below satellite image is a rough picture of the study area which included five revenue villages. All the villages are located in Bargarh District on the northern side of the hill with immediate access to the reserve forest but also with large areas of village forest within their boundaries.

Figure 2: Study area for the project



Note: Red is the forest boundary from official toposheet maps, blue is the District border, black is metalled road, yellow and dotted blue are gravel roads

Questionnaire

A stratified random sample livelihoods questionnaire was carried out in all the study villages to get a better understanding of residents. Apart from understanding general livelihood concerns and conditions the questionnaire aimed to capture uses of common property resources related to the forest.

The sample size of 20% of village households resulted in approximately 150 questionnaires being completed with 473 individuals. Questionnaires are indispensable tools to understand how resource access and use varies between villagers. It informs the researchers about how resources are divided between groups in each village and allows for the identification of specific resource users which can be approached for personal interviews and focus group interactions.

Focus group discussions

Focus group discussions are especially useful when getting to know the villages and the people who live in them. Focus group discussions can be made to understand perceptions about what resources are particularly useful in the area for livelihoods, who uses and controls them etc. As the understanding of village dynamics improve specific groups can be brought together to discuss for example the collection of various forest products. Focus group discussions may also prove useful initially to get an understanding of the village history.

Different resource user groups were identified in village interactions:

1. NTFP collectors
2. Grazing
3. Medicinal plants
4. Firewood collection
5. Bamboo

Personal interviews

Personal interviews were carried out with local informants to get an overview of the area, its history and peoples. The strategy was to interview people holding influential positions such as Gaunthias or Panchayat seats, but also to identify major land owners or other particularly influential or knowledgeable people.

For all the villages interviews were made with:

1. Gaunthias (village heads and at times also village priests)
2. Shankars (chowkidars but at times also village priests)
3. Vaidhyas (traditional medicinal men)
4. VSS presidents and members

GPS

To complement the ethnographic work GPS devices were used to record important locations and to do walking tours. A GPS allows points to be recorded with a precision down to 3 metres error margin. This is good enough detail for most purposes in the forest but can only be used as an indication for agricultural fields which require further detail. GPS devices are however commonly available at a relatively low cost these days. They are even built into many new smartphones which further reduces the challenges with handling them since most people know how to operate a mobile phone.

Particularly important to record with the GPS devices were the trishumali boundary stones which mark the meeting points between three revenue villages. These points are easy to identify on the revenue maps and could be found in most cases on the ground to form a basis for digitising the maps. This is necessary work since revenue maps do not come with coordinates. Once locations have been recorded it is easy to import these into various software which can run on a regular PC. Oskarsson (2012) contains further details about the mapmaking methodologies used in the project.

2 LAND, FORESTS AND RESOURCE MOVEMENTS IN WESTERN ODISHA

This chapter provides the context of agriculture and forest resources in Western Odisha and how unsettled rights to land and forests have created injustices which have led to struggles both historically and in the more recent past.

Land and resources in western Odisha

Western Odisha has come to be associated with droughts, agricultural distress and mass migration in recent years as part of the impoverished KBK region (forming the earlier undivided Districts of Koraput, Bolangir and Kalahandi). Bargarh District, which was the western part of Sambalpur District until 1992, is in a transition zone between the KBK region and the somewhat better agricultural opportunities closer to the Hirakud dam of Sambalpur further to the east with pockets of good agricultural conditions. Usually these pockets are closer to local towns where irrigation facilities tend to be better as well as having access to credit and better electricity supply. Increasing competition over land and water between industry and farmers is expected to have significant livelihood consequences in the coming years (Panda, 2008). In areas with rain-fed agriculture not only are farmers able to get only one crop per year, the uncertainty of this one crop leads to high variability in harvests from one year to the next.

The way land was settled historically continues to influence actual land use to date. Western Odisha was under the rule of the Bengal Presidency and the Central Provinces during colonial rule with mainly zamindari land tenure arrangements. These zamindaris in turn operated with a further layer of intermediaries in the villages (Mearns and Sinha, 1999). By paying a fee to the colonial government the princely states and other intermediaries got full control over its respective areas where the tenants had very limited

rights. With very varying capacity to govern as well as to administer justice it was only natural that a large number of protests occurred (Pati, 2007). All in all there were 26 feudatory states with mainly Oriya-speaking populations which were merged with Odisha state at independence. A wide range of administrative and social practices continued to exist within the state however only to slowly be brought under unified governance in recent decades. While many laws have been framed since Independence to improve the access of poor people to land an unequal pattern of land use continues to this day with village heads, referred to as Gauntia, having inherited land and possibilities to influence the rest of the village to this day.

The northern side of Gandhamardhan appears to have been part of the Borasambar zamindari headquartered in Padampur while the Patna kingdom to the south incorporated largely present day Bolangir District. The larger administration included a lot of changes back and forth and was in 1936 reorganised into an Orissa States Agency (Devi, 1992). Despite the many changes in formal overall rule, in everyday practice a large part of governance appears to have been centred on the many smaller princely states. According to local accounts during fieldwork the villages close to Paikmal had been settled three generations earlier based on land grants given by the local ruler. This is not an unlikely explanation since it was common for zamindaris to provide such grants to particular people who were in their favour (Panda, 2005).

With only minor land reforms carried out since independence land remains largely settled as it was during colonial times with unequal access both in terms of quantity and quality, for example in terms of good water availability, to land. Dominant groups can thus continue to use a disproportionate amount of land. When the best land is not available many continue to cultivate land settled as government owned. There are even 5000 entire villages inside forests but the problem also relates to areas administrated by the revenue department (Sarap, 2007).

Forests in Odisha have been formalised under either revenue or forest department administration which continue to exist side by side with little internal coherence to date. This divide was initially created for historical reasons when flatter 'revenue land' in valleys was settled first (Kumar and Kerr, 2013). At a later stage of the 19th century sloping land tended to be settled as unsuitable for cultivation and owned by the government as forest. This excluded large parts of land traditionally cultivated by adivasi

groups across the state leading to significant protests and some amount of legislative support. It is for example illegal to transfer adivasi land to other groups according to the OSATIP legislation³. The state itself frequently acquires land for industries, mines and dams however and has remained able to take also adivasi land. This even despite the outright ban in the OSATIP of making adivasis landless (Kumar et al., 2005).

At Independence many forested areas in Odisha remained without detailed settlement of rights. The state government attempted to clarify actual land uses but continued the earlier view of shifting cultivation on slopes as an evil which should be stopped. Lands on which such cultivation took place was either settled as state forest, if on forest land, or as government-owned wasteland or revenue forests if on revenue land (Kumar and Kerr, 2013).

Forests play a particularly important role for landless people. It can also support livelihoods in the dry season when agricultural activities are not possible. 80% of forest income is generated during the summer accounting for as much as 25% of the total household income. Forests are crucial in lean summer months but also provide significant resources compared to other opportunities. In many parts of Odisha communities had taken own responsibility for the management of forests long before the Forest Department and, even later, its Joint Forest Management (JFM) initiatives came along. About 8,000 such groups continue to operate today though many of these have now been converted, at least officially, into VSS groups (Sarap, 2007).

Limited land reforms have reduced the number of large farmers in the state since the 1950s. But this redistribution has only marginally benefited smaller farmers (those with less than 2 ha of land) who continue to be more than half of all farmers (Mearns and Sinha, 1999). The injustice of adivasi land labelled as forest has only begun to be addressed in recent years. Particularly important in this respect has been the passing of the Forest Rights Act 2006. Since the Act remains under implementation it has unfortunately not been as effective as it could have been. While some areas across India has seen a lot of land claimed by adivasis and other traditional forest-dwellers this appears not to be the case in Western Odisha. Certainly very few had at all heard about the Act during fieldwork in this project and even less been able to make any claims.

³ Orissa Scheduled Areas Transfer of Immovable Property (Scheduled Tribes) Regulation, 1956 as amended up to 2002.

The reserve forests of Bargarh District are administered as part of the Sambalpur Forest Division⁴ which in total contains 79,000 ha of reserve forest exists spread across 60 forests (Mishra et al., 2008). Overall 37% of the area of the state is officially labelled as forests but actual forest cover is not more than 30% of the state's geographical area. This forest is mainly as reserved forests (45%) but also different forms of protected forests. There is also a significant portion of forests under the revenue department, so called village forests, at 28% of the total. Though all forests are supposed to be managed by the forest department in reality it controls only about 45% of even the reserved forests since much of this type of forest falls on revenue land (Sarap, 2007).

Forest products, like forests themselves, are seen by the government as state property. And this is irrespective of even NTFP which has grown on private land rather than in the reserve and other forests. While this basic setup remains in place significant liberalisation to the NTFP policy has taken place in recent years. Since 2000 a large number of NTFP items, 68 in total, are under the control of village councils (Gram Panchayats) in Odisha and the many trade and transit permits along with royalties have been removed. The state however retains control over the most profitable products including kendu (tendu) leaves, bamboo and sal seeds. Depending on the economy of the particular NTFP some which are of significant livelihood importance are less restricted by the government. Mahua flowers, hill brooms, and tamarind are examples of items sold locally without much higher-level government involvement (Saxena, 2003). The making of liquor based on the Mahua flower, the main use of the flower, is however also monopolised by the government and licensed to a few companies.

Forests are also a major source of income for the state government at 9,600 lakh rupees in 2002-03. Kendu leaf trade accounted for a large part of this at 7,500 lakh rupees (Mishra et al., 2008). 90% of total government income come from NTFP and not from timber in Odisha. Despite this significant and growing income for the state mineral lobbies continue to set their policy preferences due to the poor representation of Western Odisha and adivasis especially on the coastal-dominated state government (Saxena, 2003).

Government and company interest at Gandhamardhan have in recent decades tended to focus on the large deposit of bauxite ore, approximately 200 million tons in total, which

⁴This division includes Jharsuguda, Sambalpur and Suvarnapur districts in addition to Bargarh.

exists on top of the hill. From time to time since the 1970s when the ore was first discovered the Hill has been proposed for bauxite mining but to date no mining has taken place. Mining plans have proven very controversial due to the overall biodiversity, the spiritual and religious importance, and the presence of tribal and other forest-dependent communities living on and close to the Hill. As far as is known there are no immediate plans to mine but Gandhamardhan continues to be linked to various mining companies ranging from NALCO, to Vedanta and the Canadian company Balaton Power (Gallo, 2007). The many years of strong resistance to mining from the mid-1980s continues among local groups and movements however making Gandhamardhan a particularly suitable location for the proposed resource mapping.

With much of the essential minerals washed away in the leaching process which formed the bauxite deposits and little or no topsoil remaining, it is common to find the immediate top portion of bauxite hills in Odisha largely without forest or other vegetation beyond grasses and shrubs while the hill sides are richly forested. While other causes of varying forest cover exist locally, including government and local practices, this fundamental characteristic of the east coast bauxite hills is the cause of one of the most frequent disagreements on the consequences of mining. Those in favour of mining see a rich bauxite deposit on a bare hill top with few habitations, while those against see forested hills with springs flowing down its sides throughout the year to provide vital livelihood support for tribal communities further downhill⁵.

If mining was to start open cast excavation with extensive land disruption is a given when the ore exists on top of the hill with little overburden. Initial steps in bauxite mining operations, other than the construction of transport infrastructure, will be to clear vegetation, wherever necessary, and to remove the overburden. This would at Gandhamardhan not lead to the direct displacement of villages since none exists inside the reserve forest area. What is clear from the discussion which follows below is however that it would lead to various disruptions of existing uses of the forest.

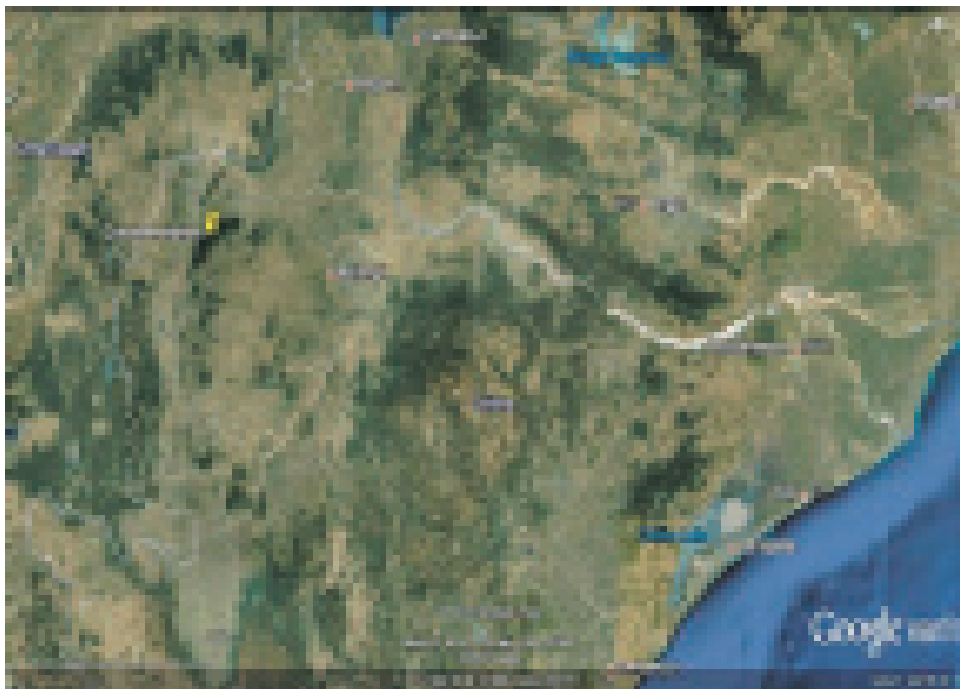
⁵ Official planning documents favour the tree free position. MoEF lists five deposits in Odisha with no or scanty top vegetation where bauxite exists but forested hill sides (Ministry of Environment and Forests, 2008). Pattanaik et. al. (2009) and Moody (2007) are examples of activists in favour of forested bauxite hills.

People and social protest at Gandhamardhan Hill

Gandhamardhan in Bolangir, Bargarh and Nuapada Districts of Odisha is a hill with a real amalgamation of peoples due to the varied administrative history with overlapping British presidencies on top of local princely states. There has also in earlier times been significant migration from North India whereas today the main migration movements are away from the region in search of work elsewhere.

Borasambar zamindari was a particularly powerful local zamindari estate with 780 village Gauntias, who worked as middlemen in one or a number of villages, under its domain up until independence. This hereditary area centred around the northern part of Gandhamardhan Hill, and was led by Bhinjal adivasis with a spiritual home at the Nursinghnath temple. For this reason Bhinjal continue to be among the most common groups in the area (Panda, 2005) though most of them are far from being influential or particularly well off outside of the former royal family.

Figure 3: Satellite image of Gandhamardhan and Western Odisha



Source: Google Earth

The entire Gandhamardhan Hill is officially settled as Reserve Forest to be managed by the Forest Department. While no villages exist within the boundaries of this forest many exist immediately outside of its boundaries and continue to depend on the forest for livelihoods as well as spiritual needs. The rich biodiversity of the hill is well-known and continues to support medicinal plant collectors, from near and far, as well as a wide range of other uses including NTFP (Non-Timber Forest Products) and firewood needs. And not only is the hill important for Hindus with two major temples connected by a pilgrimage path across the hill. Local deities are also worshipped by adivasi and other groups. As of now all these resource uses continue to exist based on traditional usage rather than any officially recognised rights leading to various forms of exploitation and a lack of control over natural resources which have been used by communities for generations.

The existence of Forest Rights and other forms of land titles at Gandhamardhan are not known in detail but statistics for the Districts of Bargarh and Bolangir are summarised in the table below. Since there have been no claims granted for Community rights in either Bargarh or Bolnangir Districts and only five claims of community rights in Nuapada it appears safe to say that the Hill remains settled as Reserved Forest despite the many existing uses of the land.

Table 1: Status of Forest Rights Claims and Titles in Bargarh District

District	Individual claims		Community claims	
	No. of claims approved by Gram Sabha	No. of certificates distributed	No. of claims approved by Gram Sabha	No. of certificates distributed
Bargarh	2,630	1,015	0	0
Bolangir	4,796	1,190	0	0
Nuapada	10,837	5,290	35	5

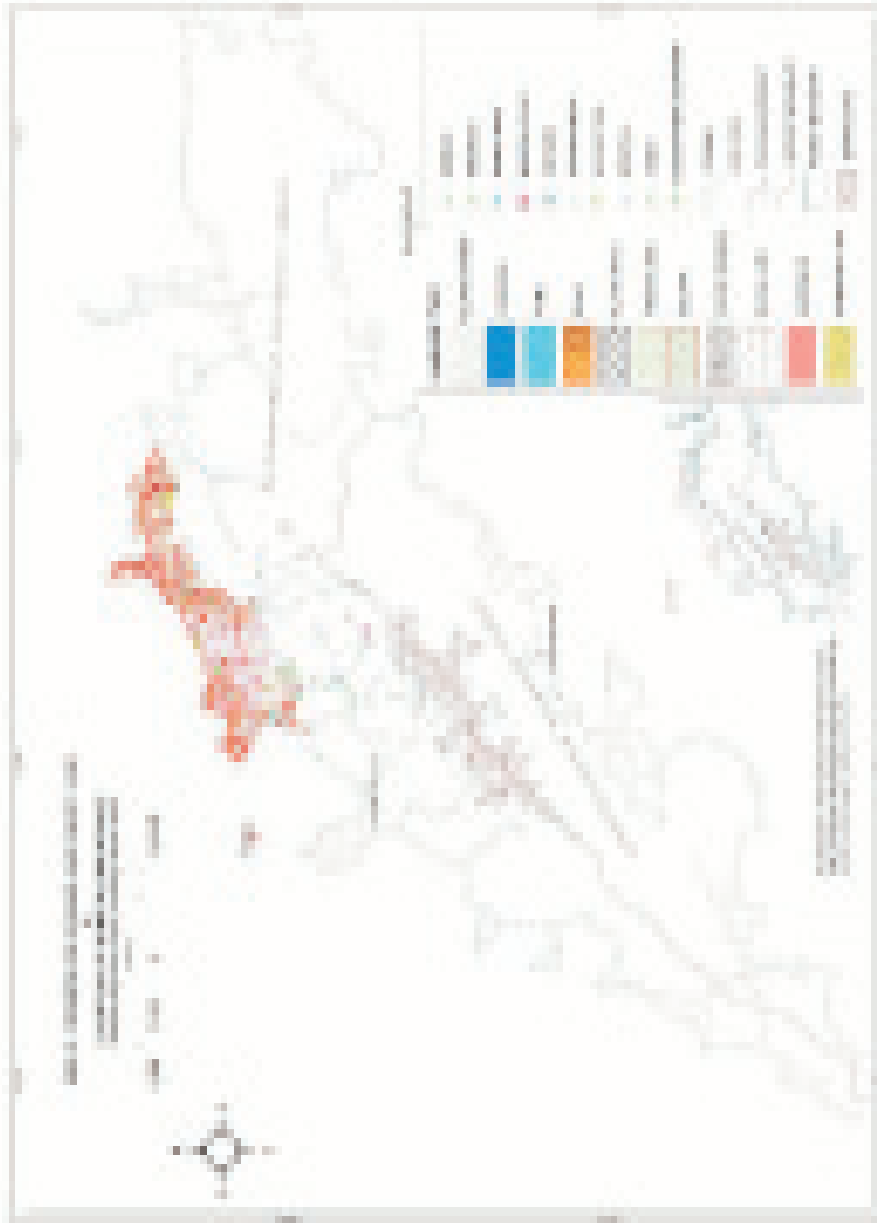
Source: 'Status of implementation of the Forest Rights Act, 2006 in the State (Orissa) as on 31-01-2013', available at http://www.fra.org.in/new/document/FRA_Jan_13_Ind_Com.pdf.

A large section of adivasi and Dalit groups had to support themselves as agricultural labour since the days of the princely rulers. If at all able to cultivate own land this tended to be shifting cultivation on forest land, particularly by adivasis. Significant land was also sold to mid and higher caste groups although there was legislation aimed at preventing this. Overall these groups had very marginal opportunities (Pati, 2007). More recently Marwari and Gujarati groups have moved into the area and have come to dominate trade and commerce. Occasionally they have also entered the agrarian economy by buying up land (Padhi and Panigrahi, 2011).

After "decades of chronic poverty recurring droughts, unemployment, and backwardness [this] part of the state has witnessed a large-scale distress outmigration (Panda, 2008)." The majority of those who migrate are low-skilled workers who end up going to nearby states to work in construction, in brick kilns or in textile factories doing heavy manual labour. Working long hours in largely unregulated establishments leave the workers to often face exploitation (Ibid.). One estimate is that 200,000 workers migrate every year from Western Odisha (meaning from Bolangir, Kalahandi, Bargarh, Nuapada and Sonepur districts). Of these 100,000 to 150,000 are expected to work in brick kilns in Andhra Pradesh. This sort of data tends however to only mention the main male worker who is registered with the company whereas in reality entire families tend to migrate. As many as 35% of migrant workers in a study in Hyderabad were found to be children (Smita and Panjjar, 2007).

While movements such as those at Gandhamardhan have remained peaceful even during times of police oppression, increasing security concerns have come to affect the Western Odisha in recent years. To date the impact on local social movements has been limited but an increasing militarisation could change this in coming years. Various groups of Maoist revolutionaries have existed in parts of central and eastern India ever since the 1960s. Odisha has not been known as a location for Naxalite operations historically but this has changed dramatically in recent years as part of an overall expansion across large parts of central India. While present in the state from 1985 there were no attacks on the state government until 1997. Counter-violence by the Odisha police was therefore also limited. It is known that the state police informed the Andhra police force about the presence of Naxalites and allowed it to enter the state on some occasions. From this time on especially southern Odisha has seen much more activity and now Odisha is one of the states in which the Naxalites are most active (Dash, 2006).

Figure 4: Overview of Gandhamardhan Hill and the study villages



The poor socio-economic development of large parts of southern and western Odisha continue to provide support for various protest groups including Naxalites. And increased large-scale acquisition of land for mining and industries will also increase the marginalisation of poor people in Odisha leading to further risk of conflict (Acharya et al., 2011; People's Union for Civil Liberties et al., 2011). The recent increase in activity in the state must to a large extent be seen as related to the difficulties for the CPI (Maoist) to operate in either Andhra Pradesh, which for many years was a stronghold of the Peoples' War Group, or in Chhattisgarh. Odisha has at least partially become a refuge for Naxalites escaping from these two states.

Once established in southern Odisha Naxalites have also come to operate across western parts of the state. A number of serious incidents are known to have happened. The most serious incident at Gandhamardhan was the encounter killing by police forces of one GSYF member in 2010 which the movement is still attempting to get justice for. Other incidents have also occurred very close to Gandhamardhan such as the killing of one person in Nuapada District and one in Bolangir District November 2011 (CGNet Swara, 2011). Another example is how five persons were killed in 2005 in Sambalpur district (Dash, 2006). With the Maoist presence have come increased security operations by state police and special security forces resulting in controversial encounters which allegedly involve local villagers rather than actual Naxalites. The CRPF has established a number of large camps across Western and Southern Odisha and are increasingly getting more weapons from the central government (People's Union for Civil Liberties et al., 2011). Overall these incidents and many others like them have created an environment of increased insecurity in western Odisha. This insecurity is likely to be particularly strong in forested areas since this is where Maoist groups tend to look for refuge.

The movement against BALCO at Gandhamardhan

Gandhamardhan first came to prominence among social movements as a mining destination when then public sector Balco (Bharat Aluminium Corporation) proposed a mine there in 1983⁶. BALCO had existed since 1965 as the result of Hungarian-Indian government collaboration in Korba in present-day Chhattisgarh West of Gandhamardhan. Technological problems however prevented the company from operating properly for

⁶ Balco was controversially partially privatised and sold to Vedanta Resources in 2001 but the Government of India remains a large shareholder.

many years and once it did the ore reserves were insufficient. It was in the search for new ore that BALCO came to Gandhamardhan (Mishra, 1987). Balco promised a project of national importance with some local benefits including a train connection, electrification of villages, housing and the employment of about 500 people (Mishra and Panda, n.d.). The project would thus bring in development to a poor and so called backward area which would strike a balance between the new and the old temples of India. Publicity material stated that "Gandhamardhan will truly come of age with old holy temples of Narsingnath and Harishanker and modern industrial temples co-existing and enriching each other"(Cited in Concerned Scholars, n.d., 2).

Because of these promises and an overall low understanding of what the project implied initial resistance to the mining project remained low locally. Little actual displacement was part of the project which would take place high up on the Hill. Employment was being offered via the project and it appeared to perhaps not offer major improvements but at least some new opportunities in a poor area (Concerned Scholars, n.d.). It was only in 1985 when blasts which were part of construction work destroyed parts of the ancient Nursingnath temple that people started protesting under the auspices of the Viswa Hindu Parishad which organised a local movement under the name Harishankar Narsingnath Surakhya Samiti (the movement to save Harishankar and Nursingnath).

This movement made use of Hindu mythology in combination with rich biodiversity and local tribal heritage myths (Padhi and Panigrahi, 2011). This provided for strong support since "[t]he villagers equate [Gandhamardhan] with their mother, who provides them with food, firewood and fodder. According to the villagers, She further provides water through 22 streams and 150 perennial springs. The stream water is referred to by the villagers as mothers' milk, and the plants as an integral part of her body (Concerned Scholars, n.d., 9)." The spiritual dependence on the hill was complemented by the fact that agriculture in the area depended completely on the streams which originated on the Hill. Although the area is not among the best for cultivation the importance of the Hill in an otherwise flat and arid region was clear.

A few activists came to be concerned about the larger environmental and livelihood aspects of the BALCO project. Many of these were based at Sambalpur University but there were also a number of other groups including PUDR (Peoples Union for Democratic Rights) and PRIA. These groups and many others started spending time at the Hill preparing reports which questioned the project (See for example Concerned Scholars,

n.d.; *Fighting for Survival: People vs. Balco*, n.d.; Panigrahi and Mishra, 1986; Sambalpur University Teaching staff and research scholars, n.d.). Once initial questions were starting to be raised further opposition was localised in the form of the Gandhamardhan Yuba Surakhya Parishad (GSYP). This group was formed in 1985 by local youth with representation from almost all villages in the area but also drew significant support and initial leadership from nearby towns including Sambalpur (Padhi and Panigrahi, 2011). It was at this stage when concerns became broadened beyond that of the temple to include the environment and wider poverty reduction. In a sense the movement at this point became secularised (Concerned Scholars, n.d.).

The agitation intensified in the mid to late 1980s. During this phase mass protests were organised on a regular basis. 900 people were arrested and 186 sent to jail in Bargarh when GSYP decided to prevent all attempts of BALCO to carry out its work via road blockades and sit-ins at the sites. The local struggle was also supported by national environmental and social activists who produced a wide range of supporting articles and reports. In the end it was mainly livelihood concerns and local mobilisation which forced the company to leave in 1988 at a time when across India a number of movements against displacement, especially from dams like the ones along the Narmada River, were increasingly making their voices heard. The difference between dam agitation and bauxite movements, such as the one at Gandhamardhan, has been lower direct displacement in the latter case, but enduring concerns about indirect long-term loss of livelihoods when water and forests are disturbed from mining. In addition the proposed bauxite mining areas have often had great environmental values justifying conservation. These concerns remain largely unaddressed to date by the promoters of bauxite and other forms of large-scale mining (Oskarsson, 2010).

To this day whenever new mining plans are discussed in newspapers it is to be expected that the GSYP will immediately launch protests and hold meetings. This ongoing vigilance for more than 25 years makes it clear to decision-makers that they can not easily go ahead with mining plans without significant protest from a group which has many supporters and a history of successful resistance. Given the widespread poverty and poor governance in the area the organisation has also had to take up many other issues over the years apart from that of mining. The movement which does not rely on any outside sources for funds or other support remains an impressive local support group which aims to both protect the Hill and support the people who live in the area.

Nowadays there has been a split in the movement with a new organisation called the Kapil Muni Ashram working separately to GSY. The ashram appears to be better connected among intellectuals across Odisha while GSY is a more local movement based at the Hill though it too is not without supporters based in other locations. While the ashram focuses on spiritual and moral education the GSY is involved in a wide number of livelihood and cultural activities in the villages. GSY is more broad-based since it has office-bearers in all blocks around the Hill whereas the ashram operates from its two facilities close to the two temples next to Gandhamardhan (Interviews with local leaders in December 2011).

The local movements at Gandhamardhan continue to remain vigilant over mining proposals. This is needed since the hill continues to be proposed for mining from time to time. This is most apparent in mine evaluation and planning documents such as Gallo (2007) but also in various newspaper reports in which especially Vedanta, the present owners of BALCO, and NALCO have figured in recent years (See for example Nayak, 2013; The Hindu Business Line, 2007; Times of India, 2010). It might even be possible to see the continued discussion of mining plans in the media as an important reason for the possibility to continue keeping the issue alive locally this many years after Balco was forced to withdraw.

3 LIVELIHOODS AT GANDHAMARDHAN HILL

In this chapter fieldwork results related to livelihoods are discussed. These relate both to settled agriculture and various forest-collection activities which were found to exist virtually among all groups of people in the study villages but also in relation to a few specialised groups. A wide variety of people were encountered in the study villages with most of them containing a mix of ST, SC and OBC groups. Most of the people had lived in the area for generations indicating the mixed settlement history of the area. And most were found not to be very well-educated. Given the lack of non-farm jobs people almost exclusively had to rely on agricultural and forest activities if not migrating to other areas for part of the year.

As is well known a large part of the population migrate seasonally away from Western Odisha. This was also the case in the fieldwork villages despite their proximity to Gandhamardhan and its forests which could to some extent help people survive in the lean season. The most commonly cited reason for migration was the poor availability of water which together with few irrigation structures ensured that almost all farmers could not hope for more than one crop per year. Despite most households having some amount of land in their possession they could not hope to make much use of it when irrigation facilities were poor.

The people of the study villages

The history of settlement in the Gandhamardhan area has contributed to a very diverse region today. Interviews with villagers made it clear that most of them had lived in the area for at least a couple of generations but usually not more than this. Villagers provided details about having moved to the area to find new land as part of princely land grants to establish villages at Gandhamardhan in the early parts of the 20th century. It seems possible that the lack of adivasi land protection, the entire area is outside of the Scheduled

Areas despite its high prevalence of adivasis, has also enabled recent migrants to find land up to only a few decades ago. The reserve forest is also in a remarkably good condition in terms of having actual forest cover. This is despite an overall lack of evidence for institutions, formal or informal ones, to monitor and improve the forest during fieldwork.

Table 2: Paikmal Block Population Statistics

	Population
Male	99,718
Female	100,346
SC Population	29,276
ST Population	75,106
Total Population	200,064

Source: Government of Orissa, Odisha Sampad (<http://www.orsac.org/odishasampad/>) based on Census 2001 data.

The table below provides details of the very varied people of the study villages. While adivasis is the largest group they are only slightly more than a third of the overall population. And among adivasis several groups were found, particularly Khond and Bhinjal but also Keuta, Sabara and Saura. Similarly people of Dalits and OBC backgrounds were also from a number of different communities.

A total of 122 household questionnaires were collected during fieldwork. These were divided as follows: Rasmunda 21, Majhipalli 19, Bankhoti 29, Magurmali 13, Lergaon 25 and Khandijharan 15. The households were purposefully selected to comprise all the main communities of each village, that is with participants of general category/OBC, SC and ST groups. In the sample villagers these groups were on average found to be relatively evenly matched with a few more ST inhabitants. Within each community participants were randomly selected creating an overall stratified random sample.

94 of the 122 households were born in the present location which is quite surprising in a region with very mixed communities and, at least nowadays, a strong tradition of outwards migration. There was also no noticeable difference between ST and SC groups in terms of their roots in the area. In one predominantly adivasi village all households

Table 3: Study villages of Paikmal Block

Village	Gram Panchayat	Number of households	Population			
			ST	SC	Other	Total
Khandijharan	Jhitiki	96	344	30	32	406
Ranjitpur (Consisting of Bhankhoti and Magurmal)	Jhitiki	240	102	538	364	1,004
Lergaon	Bhengrajpur	124	172	154	184	510
Rasmunda	Bhengrajpur	74	108	40	146	294
Majhipalli	Bhengrajpur	122	286	118	140	544
Total		656	1012	880	866	2,758

Source:: Government of Orissa, Odisha Sampad (<http://www.orsac.org/odishasampad/>) based on Census 2001 data.

responded that they were born in the present village. In the OBC/general category there was a larger number of households who had moved to the present location.

Outwards seasonal migration was present in all the villages but not as large as the literature and initial interviews would make it appear. Between two and five households from each village migrated, or 19 in total out of the 122. And of these some members of the family tended to stay back in the village while others migrated. Since comparative data of villages further away from the Hill is not available it is not known whether the reserve forest enables more people to remain in their villages at the forest fringe.

The most common work for the migrants was in brick kilns though the destination of this work was spread across neighbouring states. Of those who migrated for a better job 11 already had land in their own village. Six other households mentioned debt as the most important reason to migrate since upfront payment could help with repayment of loans. Few differences could be seen between villages in terms of migration. And people of all communities migrated.

Land ownership and use

More than 70% of the households in the questionnaire were found to have own agricultural land across the villages. And almost all the households with land had at least

some which had land title. Often this land title was in the name of an older relative. To complement the patta land many also cultivated village forest or gochar (grazing) land.

Land availability varied, not surprisingly, both between villages and between caste groups. Worst off was the village of Dalit bamboo basket makers where only 8 of 13 households had any land. This land was also of poor quality and situated at an elevation which made water access problematic. A few Dalits were at the same time among the main farmers in their villages. Most influential were the Gauntia who uniformly controlled more land than others in the villages. They also tended to own well-irrigated land. This builds on long-established historical patterns complemented with more recent land purchases made by traders and other locally influential people. A case study of Khandijharan village by Concerned Scholars (N.d.) in the mid-1980s indicated that the Gauntia and a few traders had combined to control about half of all agricultural land. This uneven ownership of land was described as common in the area at the time and there is nothing to indicate that this has changed since. The status in the village as Gauntia or other traditional position is more important than caste belonging in determining influence and assets.

Forest use was as expected common for agriculture, forest produce collection, timber (particularly for firewood) as well as for grazing. Surprisingly most of these activities took place in the village forest and not as expected in the reserve forest despite the high quality reserve forest low, the amount of forest guards present in the area and no mention in focus groups and personal interviews of other institutional mechanisms for protecting the forest. Grazing would take place in the reserve forest only during the summer season and only partially since many would stay in village forests also then. And no cultivation was recorded in the reserve forest either in questionnaires or on walking tours. It is however in the reserve forest where people go for medicinal plants and bamboo and to visit sacred groves and other spiritually important locations. The reserve forest had also been used at one point by a few people who had fruit orchards up the hill but later been forced to abandon these.

Assets and debt

Even though some migrated in order to repay debt the household survey did not reveal a large amount of households in debt nor very large debt with particular individuals. It appeared as if people did not have the means to invest in expensive improved irrigation or farm inputs to support higher yields. This was despite the fact that self-help groups and different microfinance institutes were found to have a widespread presence in the villages. A few households had also been able to secure regular bank loans.

The actual amount of lending they had done remained limited however. In cases of larger loans the source was this was often quoted as the regular bank. Moneylenders, believed to be traders located in Paikmal, were only relied on for smaller amounts in case of emergency due to the high interest rates they charged. Overall the picture was thus of very limited lending. While this seemed to reduce the need for distress migration it also indicated that people in the villages were not able to invest in improved agricultural infrastructure or facilities, like for example tea and snacks shops, which could have helped them to directly benefit from the many pilgrims who travel along the road to Paikmal every day. The entire pilgrim and tourism industry with lodges, restaurants and various shops in Paikmal is instead run by upper caste and merchant groups with little direct involvement of villagers other than as suppliers of firewood and sellers of medicinal plants in the market.

On Revenue land

The six villages studied were spread across five different revenue villages. In Bankhoti village where two hamlets existed one remained informal despite having existed for several generations. It had no electrical connection though it had wells and a recently built school. In Rasmunda village there was strangely enough one piece of land in the middle of the revenue village land which did not belong to it but was also not part of the nearby revenue forest. It was simply a white spot which could also be seen on official revenue maps in which no rights existed for the local people but also not for the government. There were no buildings in this area but several villagers had decided to farm there since the land was anyhow not being used since decades back. The local revenue department need to sort out where this land belongs before any of it can be settled as part of the village it should naturally belong to.

Agriculture

Agriculture in the study area was not surprisingly spread along the rivulets which come from Gandhamardhan. Though only one of the many rivulets were found to be permanent this is nevertheless where rain-fed farming can exist. The map in Figure 12 on page 50 shows the continued importance of rivulets for the villages despite the existence of a number of smaller irrigation dams in the area.

As discussed above overall land access was found to be relatively good for villagers. The key was however to have quality land which could deliver assured crops. Most people detailed serious difficulties with agriculture due to the lack of irrigation facilities. Even

villages located next to permanent streams immediately next to the Hill could still not make use of this water for their fields. Of all households only a handful were found to have any irrigation and often this was only a well rather than for example a pump. Poor electricity supply presumably made investment in a pumpset not worthwhile.

Adivasi members more often than other groups cultivated forest land in the village forest with scarce productivity and no irrigation facilities. In all 12 households were found to cultivate forest land only whereas 9 were landless. Of the 19 households with titles 4 of these were for the less strong ceiling land.

Dalits of the Ganda community represented an influential and in many cases relatively well-off group in the fieldwork villages. A number of farmers from this community had been able to get significant areas of farm land, at least 5-6 acres, and invested in irrigation facilities.

Many other Dalit farmers were very poor however also of the Ganda community. Ten of them were landless. The bamboo basket makers were particularly vulnerable due to their low land ownership and high reliance on bamboo from deep inside the Gandhamardhan reserve forest. Either they could be made to pay fines by the forest department or they could find it difficult to at all access the bamboo when security concerns restricted people from entering the forest. In such cases there would be few fallback options for the community since this was what many did for a livelihood.

Among communities OBC members might not have more land on average to other groups but they were able to get pattas recognised for it. And often also in their own names rather than in some older and often deceased relative. Given the ability to get patta land there were only eight households cultivating forest land in this group. There were also eight landless in this group but it appeared as if several of these had chosen to be landless since they had other jobs with better income including work at a nearby rice mill or as an artisan.

Larger land was invariably available in the study area with the traditional headmen of each village. This was despite the significant variability in peoples from one village to the next. These Gauntia had also ensured better connection to the vital water resources. But also among Gauntia significant differences existed where in one village the Gauntia was found encroaching on forest land like other relatively marginal villagers. On average the

Gauntia were much better off however and in one case even wealthy enough to have a large house and a side business running a bus company which transported people between local towns.

Grazing

Cows and goats are plentiful in the area though each household would rarely own more than a few animals each. Grazing is done communally by a few people in each village and use seasonally available resources.

Though it is well-known that the animals have to stay away from fields during the cultivation season it seemed as if this was often difficult to enforce. And even more difficult was to enforce it for the few fields which could support a second crop. This crop would according to at least a few informants invariably be eaten by the animals. Certainly there were also issues involved with the JFM forest areas which had been claimed for part of village forests traditionally used for grazing. In at least one village the herbal garden which had been planted based on a grant from the forest department was eaten by goats.

Figure 5: Goats return to the village after a day of grazing



Source: Photo taken by author in October 2011.

At least part of the forests would be used during dry summers when no other food is available and most of the open water sources would have dried up. This use of the forest was seemingly accepted by the Forest Department.

Other

NTFP collection existed also on revenue land but was in many cases not fully utilised. Presumably this was since the gain from collecting certain items was too large compared to the possible income especially when storage and transport facilities are very poor in the villages.

In the forest

Village forests are very common in the area particularly next to the reserve forest but also in other parts of each revenue village. In the village forest only people of the particular village are allowed unless special arrangements have been made to allow outsiders. This is different from the reserve forest which everyone can enter, though of course at the risk of getting caught by the Forest Department if found to be doing something illegal. Surprisingly there are no habitations within the Reserve Forests of Gandhamardhan Hill and only minor cultivation. Despite being poorly marked the boundaries of the forest remains strong and the forest cover very impressive. Village forests are used in much the same ways as the reserve forest but also has some cultivation and frequent grazing.

Attempts were made during fieldwork to understand reserve forest use by recording walking tours and locations. This was complemented by ethnographic work. Due to security concerns with Maoist and security police presence in the forest during fieldwork it was only possible to record a partial view of actual reserve forest uses. Even these recordings combined with interviews and focus group discussions made it clear that villagers regularly move across large areas of the Hill. It is however clear that people do depend on virtually the entire Hill for a number of different purposes which include spiritual needs, medicinal plant collection, bamboo and firewood (See Figure 12 on page 50 for a detailed discussion about the forest use map which was created by the project).

Restrictions on forest use were most apparent on Revenue land where several respondents detailed how they had been fined for cultivating village forest over the years. The official VSS groups which had claimed large parts of this village forest appeared to mainly exist on paper. In reality few villagers were at all aware of the VSS activities, nobody claimed

to sell its forest produce to a VSS, and on the ground a number of other uses of the village forest was recorded including cultivation, grazing and spiritual uses.

Remains of orchards could be found deep inside the reserve forest. A number of people testified to having once owned these although now they had since long been banned from actively developing them. Whatever fruits still grow on the trees could however still be collected and sold in the Paikmal market. This visible evidence of earlier uses of what is now the reserve forest were complemented by discussions of an earlier hamlet which had been abandoned in favour of residents settling in Lergaon village. While people may not have lived inside what is now the reserve forest it is clear that cultivation has taken place inside and people have in the past lived even closer to the forest than they do at present.

Spiritual uses of the forest

There can be no doubt that Gandhamardhan plays a very important part in the spiritual lives of villagers. Every single household (except one) provided details of different festivals they celebrate at the Hill. This was irrespective of which community they belonged to or whether or not they considered themselves as Hindu. Best known were the festivals of local adivasi deities and the Hindu celebrations next to the Nrusingnath temple but many other local occasions were celebrated. It was known since earlier that pilgrims come to the Hindu shrines from far away to number tens of thousands of people every year in May or June. But at least in the region the adivasi festivals are also known and people attend also these, or at the very least come to make offerings at the forest shrines and groves whether or not they consider themselves to follow the particular beliefs of the adivasi.

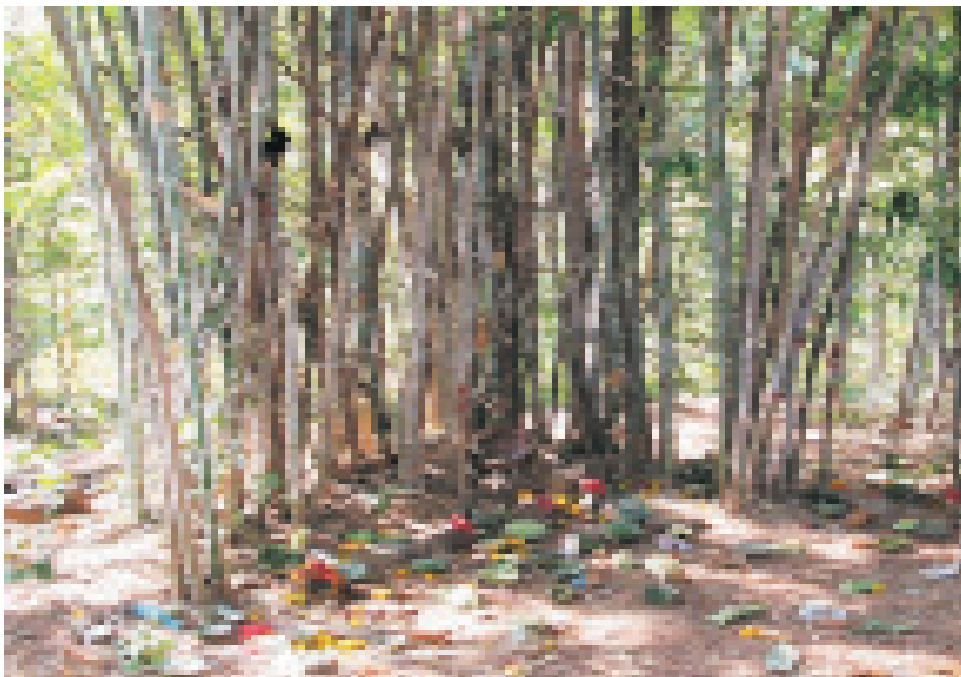
Deities were at times found in special locations such as forest shrines which could be close to the villages of the forest fringe. At these locations there could be various smaller offerings. There were also incidents of animal sacrifice, particularly in the form of chicken. One such ceremony also took place at a large tree in the village forest.

Many shrines are also deep inside the reserve forest. Some of these would take many hours to reach whereas most could be accessed relatively easily. The buddharaja shrine which is of special important to Khandijharan village but also to many who come there to worship from nearby villages and towns was found to be almost at the top of the hill. Pilgrimage walks far into the forest are also part of the ceremonies as much as particular

shrines or groves. Similarly the pilgrimage route from Nrusingnath temple on the Bargarh side of the hill cuts straight across to the other side and leads to the Harisankar temple.

Leading the spiritual life of the village is the Jhankar, sometimes referred to as Shankar. This person was often the same as the Gauntia indicating the confluence of social and spiritual influence over the village.

Figure 6: Sacred grove



Source: Photo taken by author December 2011.

Participation in festivals and ceremonies were found to be more dependent on village belonging rather than community. In questionnaires the respondents would follow largely the same festivals as all other members of that village rather than those specific to the community. This was despite the prevalence in the area of the Samaj which are associations for each caste/tribe. Also those who identified themselves as Hindu would participate in many of the adivasi and other local customs. And none of the well-known festivals of mainstream Hindu society such as Holi or Divali were mentioned by anyone as being among the most important festivals. At the same time it was clear that many of the forest shrines had been sanscritised to some extent with symbols from Hinduism.

Medicinal plants

Gandhamardhan Hill is unique in its biodiversity across not only Western Odisha but in relation to some species anywhere in India other than in the Western Ghats. The biodiversity has since long attracted people interested in medicinal plants. This continues today with local people and medicinal men searching out different plants. Though more thorough biodiversity surveys are not available interviews during fieldwork indicated that the biodiversity of the Hill is relatively uniform rather than having particular hotspots of particularly good diversity.

The sale of medicine made from plants is a major business in Paikmal. The Forest Department herbal garden in Paikmal contains 115 different species. The VSS society in Paikmal sells 29 different items according to its publicity material. The SSN Ayurvedic College of Paikmal sells 44 varieties of medicine. A significant local market for medicinal plants exists at the Nrusingnath temple which sells directly to temple visitors. The Ayurvedic College has students coming from all across the country to study. In its sales there appeared again to be no particular linkages to the villages in terms of collecting or selling plants to the college directly.

The connection between locally available plants and their pickers at Gandhamardhan, and the medicines which are sold is thus often very weak. Most items can be bought in the local market whereas specialised plants require expert knowledge usually not available with the average villager. The larger medical shops in the area have gone through significant formalisation and though still selling large quantities of 'natural' medicines these are usually factory made and not necessarily containing plants from Gandhamardhan. This means that a large part of the plants collected at the hill are either for own, local use or as a generic input into factory made medicines without much profit.

To rectify some of these problems a few local initiatives have attempted to ensure that local people gain more from the trade in medicinal plants. The NGO CCD (Covenant Centre for Development), originally from Madurai in Tamil Nadu, has a local office in Khaprakhol of Bolangir District where it trains women's groups to collect and process medicinal plants. It has been at Gandhamardhan since 2004 with a permanent base on the Bolangir side of the Hill since 2007. CCD has trained 150 women in sustainable plant collection practices and has mobilised funds for storage of the collected plants in the villages it works in (Interview CCD North Head Utkarsh Ghate, November 2011).

Figure 7: Medicinal plants sold in the market next to Nursinghnath temple, Paikmal



Source: Photo taken by author in October 2011.

In Paikmal there is also a JFM (Joint Forest Management) initiative, organised via the Gandhamardhan Vanaspati Vana Society of Paikmal, where village groups grow medicinal plants on village forest land and sell it for processing to the centre. The processed products are for sale at the Forest Department office, seemingly only in small quantities due to the oddly located office, but mainly sold at various trade shows across the state. As has been reported for many other JFM initiatives also this one was not really run by village groups but dominated by the well-educated JFM president. Village interviews with people supposedly members of one local JFM committee expressed their ignorance of at all being part of the committee let alone having any insights into what work is actually done or how the benefits are distributed from sales. And only a handful of households mentioned that they sell their NTFP or medicinal plants via the JFM committee despite almost all households collecting at least some NTFP. Another issue with the JFM medicinal plants work is the competing uses of village forests. For example goats distributed via a separate government program had eaten the saplings provided by the Forest Department with the result that very little could be produced in the particular village.

Apart from these smaller initiatives much of the collection and trade continues to be organised via smaller informal and often inherited networks of Vaidhyas, medicine men. Usually the knowledge is passed on to the sons of the Vaidhya. Keeping the knowledge secret within the family remains key to future possibilities to survive and this means that each Vaidhya might have a highly specialised skill in treating only certain diseases. Since nowadays allopathic and ayurvedic medicine is taught in various medical colleges the local, traditional medicine is being increasingly forgotten. Also in the study villages existed a number of medicinal men but also trained ayurvedic doctors. One ayurvedic doctor had a recognised bachelor degree in medicine. The people with formal degrees buy their medicines in the pharmacy and do not know about the collection of plants on the Hill. While there may be benefits to standardising medicines it also alienates practitioners from the source of the medicines even if they live just next to it.

The Vaidhya may not necessarily be located in the hill but rather come at a certain time of the year to collect plants. For the rest of the year they may be elsewhere trying to sell their preparations. They live under precarious forms since they are always at risk of getting caught by the forest department.

NTFP

During the hot, dry summers when only very few are able to cultivate their land NTFP collection plays a major livelihood role in the area. This is particularly so when the Mahua flowers bloom when even school-going children are pulled in for a few weeks to collect the valuable flowers. But many other plants exist both on village land and in the forests. A few of these like the making of leaf plates or grass brooms also require processing of the collected plants which can generate further employment in the villages.

The wide range of NTFP which is being collected at Gandhamardhan is an indicator of the good biodiversity. Since the opening up for Gram Sabha control over 69 NTFP varieties by the Odisha government in 2000 any collector has to get a license in order to be allowed to continue. To what extent this happens in practice is difficult to know however since the practice of NTFP collection is very widespread and the power of the Gram Sabhas limited. Getting the license might simply be a matter of paying the 100 rupee fee and then be allowed to carry on with the collection. Weak Gram Sabhas have tended to lead to traders dominating the NTFP collection.

The property rights for the Mohua tree is very particular since it does not follow the land on which it grows. Within each village each tree tends to belong to a certain family and this family will continue to collect its flowers despite official ownership of the land.

Kendu leaves are collected via the state government's Kendu phada collection agencies which has a monopoly on the sale of leaves. Kendu leaves is the largest NTFP item in the state and a significant business. The collection of the leaves is a major activity in the area and villagers did indicate that they did sell this produce to the government.

Firewood

It became clear during fieldwork that some villagers close to the hill but also those from further afield would travel daily into the forest to collect firewood, load it onto bicycles and transport it into Paikmal where it could be sold at a decent profit. This heavy physical work was certainly not easy but appeared to pay better than most other work available in the area. And since the firewood is available throughout the year people collecting it did not have depend on for example unpredictable rains. The illegality of the occupation certainly made firewood sellers nervous about getting caught though this appeared to happen only rarely. During fieldwork forest guards were not encountered in the forest and the collectors appeared largely able to carry out their work as they pleased. The main risk in their occupation is likely to involve going into Paikmal town since at this point the firewood has to be transported on the main road.

Villagers more than a few kilometres away from Paikmal found it too strenuous to transport the firewood to town and therefore would only cut for own needs. But there were also villages which were close enough which chose not to participate in the firewood sales for unclear reasons perhaps owing to a lack of even bicycles as transport.

Figure 8: Firewood transported by bicycle



Source: Photo taken by author December, 2011

It remains unknown how the overall quality of forest on the hill can remain very good despite the large amounts of firewood which are being sold to the tourist and pilgrim establishments in Paikmal town. Interviews and focus group discussions indicated that there was no particular institutions to regulate who could access the forest and what trees were cut down. The firewood sellers appeared to carry out this work throughout the year and across a large part of the reserve forest. Village forest could however only be accessed by people from that particular village and tended to be used for the much smaller needs of individual households rather than for sales.

The large number of bicycles stored in the yard of the Forest Department in Paikmal only makes sense in relation to the firewood sales. Since the activity is an illegal one it clearly makes especially the people who transport the wood into town very vulnerable to forest department action. In questionnaires most people mentioned bicycles as their main asset apart from perhaps land and animals indicating that it is a very important possession.

To date it appears like the forest cover remains good since much of the firewood is taken from deep inside the forest but also since it is impossible to transport it other than from a few nearby villages. The many villages which exist all around the Hill would also prevent any outsiders with large trucks to access the forest although improved roads could quickly change this. There was certainly mentions of so called forest mafias during fieldwork but actual evidence to support this remained scarce. Poor road access and many vigilant villagers is likely to put limits to how many outsiders can access the forest for large-scale extraction.

Bamboo

Bamboo is another NTFP item which is here given special treatment given its importance to one village of Dalit basket weavers. The use of bamboo is closely connected to Gandhamardhan Hill since it only grows in certain locations high up on the hill sides. Collecting it is a very strenuous tasks undertaken by the men of the village once per week. On these days they venture out of the village early in the morning only to return with as much bamboo as they can carry late in the evening.

The utilisation of reserve forest on a weekly basis throughout the year and by an already marginalised group of people naturally places significant constraints in the possibilities for the people to carry out their livelihoods independently. And since bamboo is reserved

by the state government the use of bamboo by the group further marginalises the people and makes them vulnerable to paying various forms of bribes.

The basket-weavers in the fieldwork village had a good location with access to bamboo on the Hill and sales in the nearby market of Paikmal. Despite this the group continued to live in deep poverty with few alternative livelihood options to complement the bamboo collection and basket-making which was the traditional occupation of the group.

4 MAPS IN SUPPORT OF LOCAL RESOURCE RIGHTS

This chapter builds on the livelihoods analysis of the previous chapter. By visualising resource uses on maps the attempt is to provide clear visual evidence of how resources are used by people in the study villages next to Gandhamardhan Hill.

Community mapping in an international perspective

In the struggle between mining promoters and local communities across central India over what is officially termed forest, a clear understanding of local resource uses takes on crucial importance for the ability to counter mining plans and advocate in favour of local resource rights. A number of trends have contributed to the increased interest in participatory mapping as part of social movements aimed at securing local resources. The first is the noticed inclination of governments, companies and other 'experts' to favour large-scale mineral exploitation in favour of small-scale agriculture-based uses of land. Many of the currently used planning documents supposedly assessing the impact of mining tend to hide rather than make visible even the existence of habitations and villages on and close to the sites proposed for mining. If local people are to truly be heard it would thus seem like they, or organisations working close to the grassroots, must be able to use the best available tools to show on self-produced maps not only that they exist but also why certain resources belong to them and not to the government or private companies. In sum, maps can support local livelihoods directly by preventing displacement from mining by supporting local mobilisation as well as allowing complaints to be launched in various courts and in expert committees like those of the MoEF. Maps can further support local claims for the recognition of Forest Rights titles as well as visualise currently existing inequitable uses of resources thereby working in favour of a fairer distribution and utilisation.

New technologies, including low cost GPS (Global Positioning System) devices and the free online availability of detailed satellite images and geographical databases, are increasingly putting the ability to map resources and resource uses in the hands of communities around the world (Chapin et al., 2005; Herlihy and Knapp, 2003; Orlove, 1991). This has given rise to a wave of mapping exercises where previously excluded peoples have been creating counter-maps to the ones which show the officially allowed and sanctioned resource uses. Of importance for the impact of these counter-maps has been the ability to live up to existing legislative demands when for example bringing resource claims to court, as well as the possibility to match in technical detail the maps produced by dominant groups including especially governments and companies (Chapin et al., 2005).

Internationally the possibilities for resource mapping have created a significant body of literature including the production of guidebooks to enable communities themselves to do mapmaking, and atlases of indigenous lands (Chapin et al., 2005; Fox et al., 2005; Tobias, 2009, 2000). Depending on the scale of the mapping effort and the choice of technology efforts have had varying degrees of local participation at times relying more on remote sensing for data collection (Chapin et al. 2005). These examples of manuals on community mapping are mainly based in the West however and are likely to involve educational and technical requirements beyond the capacity of the average mining-affected community in rural Odisha. Mapping work in Odisha will thus not only have to take into account the resources and capabilities of local people but also of potential resource persons at NGO and with social movements who might have the ability to carry out the work.

In addition there is a need to understand legislative requirements to ensure that maps created are useful for the purpose of resource claims and resource protection. This knowledge not only determines where the most promising opportunities exist to use mapping techniques but also the quality and type of maps that need to be produced in order to be seen as legitimate. As far as is known resource mapping has not been attempted on a larger scale in India as of yet. In relation to mining and the possibilities for forest-dwellers to claim land or forest rights titles no similar attempts have been made to date.

Resource governance and the use of maps in India

The use of maps and surveys to establish land rights has a long history in India going back to Mughal and Maratha periods. The British greatly expanded the scope and use of

these methods however particularly in forest areas (Kumar and Kerr, 2013). Since Independence a similar set of modernist aspirations to those of the British have guided Indian bureaucrats and policymakers particularly in their attempts to keep social and natural uses of land separate. While this has been much discussed in relation to forest it also appears to apply to other land uses. Robbins (2001) discusses the semi-arid regions of Rajasthan where a modernist discourse attempted to hide the actual hybrid land uses which had existed for generations. In relation to forests mixed agro-forestry landscapes tended to be converted into either legal forests or agricultural land thus removing the in-between category which had supported a wide range of peoples (Kumar and Kerr, 2013). The history of maps in India to date has thus been more widely related to the use of official power rather than as a form of support for marginalised groups.

Even in areas where land has been surveyed land records remain frequently of poor quality and out of date. Officially land records are supposed to be updated every 20-25 years but at times this has been delayed. So called settlement camps are continuously working across Odisha but at a slow pace which has caused long delays in many locations. In certain cases land details have not been updated for as much as 50 years (Mearns and Sinha, 1999). Similar experiences across India are also reflected in official Government of India reports where supposed updates of land records every 15 years at times only occur every 30 or so years. Reasons for these delays include the low priority given to land records management with inadequate budgets but also a reliance upon outdated and complicated, time-consuming survey methodologies which do not take into account technological improvements in recent decades (Department of Land Resources, Ministry of Rural Development, 2009).

Maps are vital in presenting project plans for a wide variety of purposes. The number of maps required and the detailed specification of these have improved in recent years as GIS technologies have become mainstreamed for planning purposes. Best known is the use of maps for environmental and forest approvals at the MoEF of the central government. EIA reports are supposed to provide a detailed view of the surroundings of a proposed project site. In reality only an overview of 10 km prescribed by the MoEF tends to be used. These maps do not show the detailed picture of the immediate natural surroundings and features, for example streams of water, which can help identify important characteristics at a site. Habitations are usually not shown on the overview maps. The above mentioned problems with out of date maps and continued difficulties with recognising villages in forests contribute to the invisibility of people. The sensitivity of

maps has come to mean that high quality, though often somewhat outdated, governments maps are very difficult to acquire within India and not at all for sale internationally⁷.

Revenue maps are another kind of important maps with less visibility since they do not usually become part of public documents like EIA reports. They are also difficult to interpret or combine with larger area maps since they tend to lack scale information. In many locations also they suffer from being out of date (see below for an example revenue map from the study area). Locally revenue maps tend to be available however as is clear in this project. Additionally there are websites which can be utilised to provide further details. There is thus some basic data available which can form the basis for mapping agricultural and village forest land. The extent and availability of forest maps remains unknown.

Related to the digitisation and updating of land records is also the need to update village cadastral maps which in many states are more than 50 years old and were originally made by the British. "Over the years, [the maps] have been subjected to the vagaries of the weather, continuous and improper handling, and unscientific methods of storage, rendering them fragile and tattered. The maps have also undergone shrinkage affecting their accuracy and their credibility (Department of Land Resources, Ministry of Rural Development, 2009)." It appears as if progress on digitising the actual maps has been very partial to date.

The maps of the research area were all made during the last land settlement in 1976-77 implying that many changes would have taken place subsequently. Nevertheless this is the best maps available for revenue land and they do provide a good picture of land holdings at the village level including the common property village forest and other forms of land.

In conclusion, the challenge to carry out community mapping in India becomes greater than internationally since official maps are difficult to at all get hold of and once acquired are often of poor quality and out of date. This in combination with the capacity limitations among civil society groups and movements, particularly in rural areas, create clear difficulties in realising the possibilities mapping has to offer. It was for these reasons that Oskarsson (2012) suggested one simple and one advanced approach to community mapping to allow those with limited resources to at least realise the possibilities of maps

⁷ One example of the desperate shortfall of maps internationally is how Russian maps from the 1960s are still for sale at the University of Texas map library.

in support of forest rights to be made. The simple approach was to use a GPS and Google Earth whereas the advanced approach involved digitising the revenue maps to plot each parcel of land in detail.

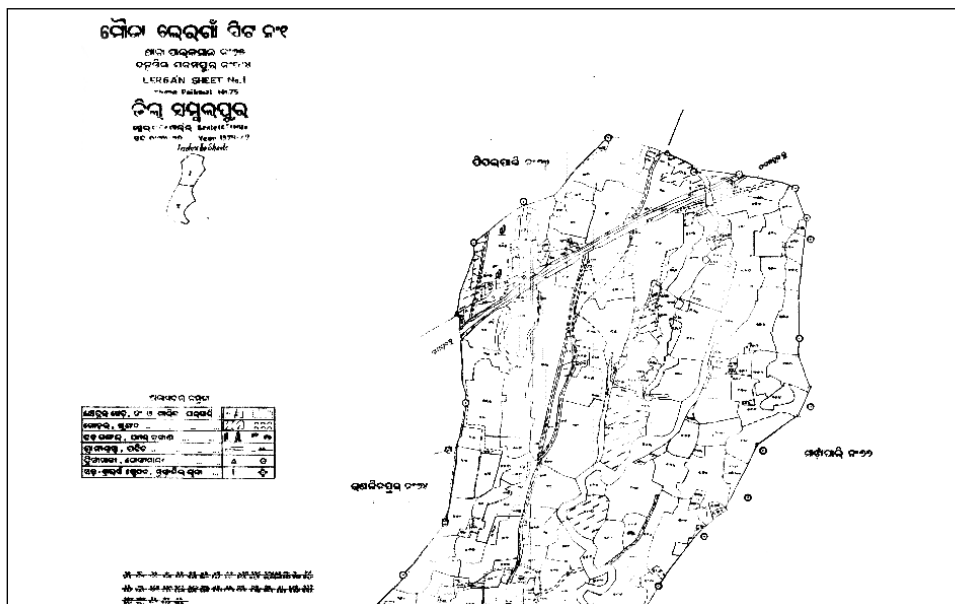
Maps for local rights to land and forest

The discussion on maps produced by the project is separated into those relating to revenue (other than forest) and those relating to forests due to the different legal support which exists for the two.

Revenue land

One important part of the project work was to show that it is possible to access, digitise and improve the existing Odisha government cadastral maps. Although the cadastral maps are usually both outdated and worn they do provide a very good base map which saves a lot of work for map makers. Accessing the maps was not as straightforward as had been anticipated given that team members had earlier experience with where to go and who to ask for such maps. In the end access was possible and as can be seen in Figure 9 and Figure 10 below it was possible to dramatically improve the quality of the digital maps compared to the originals (full size maps are available in the Appendix). For further details about how this was done please refer to Oskarsson (2012).

Figure 9: Partial view of the original revenue map for Lergaon village



Source: Odisha Government 1978

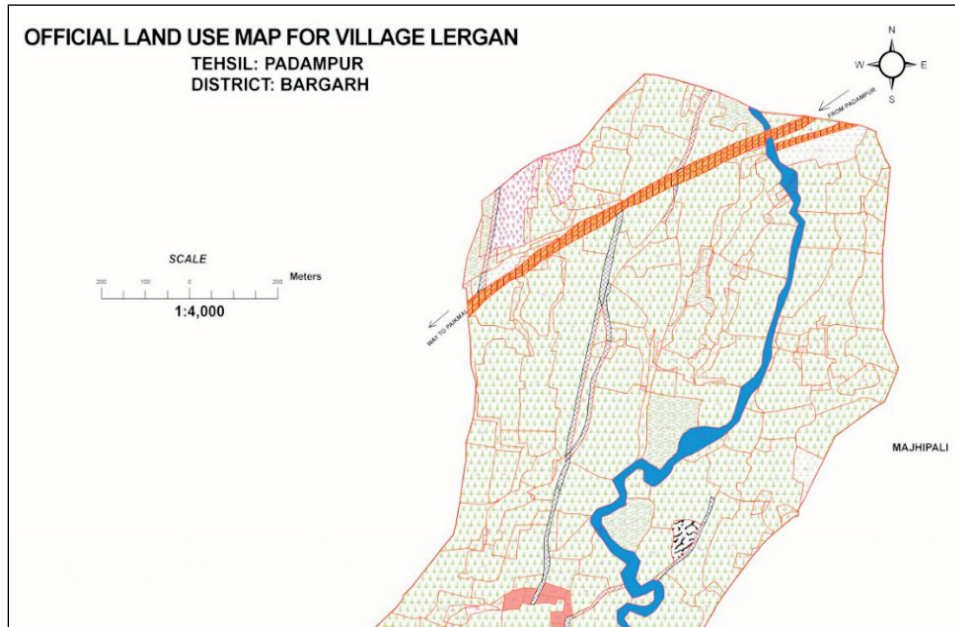
Since it is well-known that the cadastral maps are old and even when completed might not have been entirely accurate it was expected that the project would find many discrepancies. Each cadastral map did indeed contain errors but overall perhaps fewer than what could have been expected with less than 5% of non-agricultural use converted to agriculture. The connection between use of village forests and water scarcity is most apparent for the village Ranjitpur. Here significant areas of village forest exists but only minor fields are cultivated along the streams which bring water from Gandhamardhan. In interviews villagers indicated having to pay repeated fines for the cultivation of village forest.

As much as agricultural fields it was actually other non-village activities which were responsible for a large part of the discrepancy between cadastral maps and the land uses recorded during fieldwork. This involved for example irrigation dams in the villages of Ranjitpur and Lergaon and a Forest Department demonstration site in Khandijharan village. Other discrepancies involved the entire village of Majhipalli which decades ago had shifted a few hundred metres from the location indicated on the revenue map. Remaining in the map village location was now only the Brahmin village Gauntia's estate, a massive property with agricultural fields where houses used to exist. And in Rasmunda there was the earlier mentioned white spot of land which did not belong to the government or anyone else. Each revenue village studied thus contained quite dramatic errors.

In the cases of the Lergaon dam and the Khandijharan demonstration site interviews testified that this land had not been forested prior to the government taking over but rather agricultural fields. The dam and the site might thus have been intended to improve conditions in the villages but at the same time they displaced people without compensation since no land tenure existed. The displaced villager in Khandijharan in an interview stated that he did not have the courage to complain since he was worried of further fines. It is clear that multiple unrecorded land uses exists in many cases. Whenever a new project is proposed by the government this land is most at risk since it does not have a recognised tenant nor good forest cover to justify protection.

The project used GPS measurements and satellite imagery to detail agricultural fields on village forest land in all the villages. The maps available in the Appendix each detail a number of such fields. The maps could in this case become a starting point for further investigations into a proper settlement of land in the area.

Figure 10: Improved revenue map for Lergaon village



Source: see Appendix for complete map of this Revenue village.

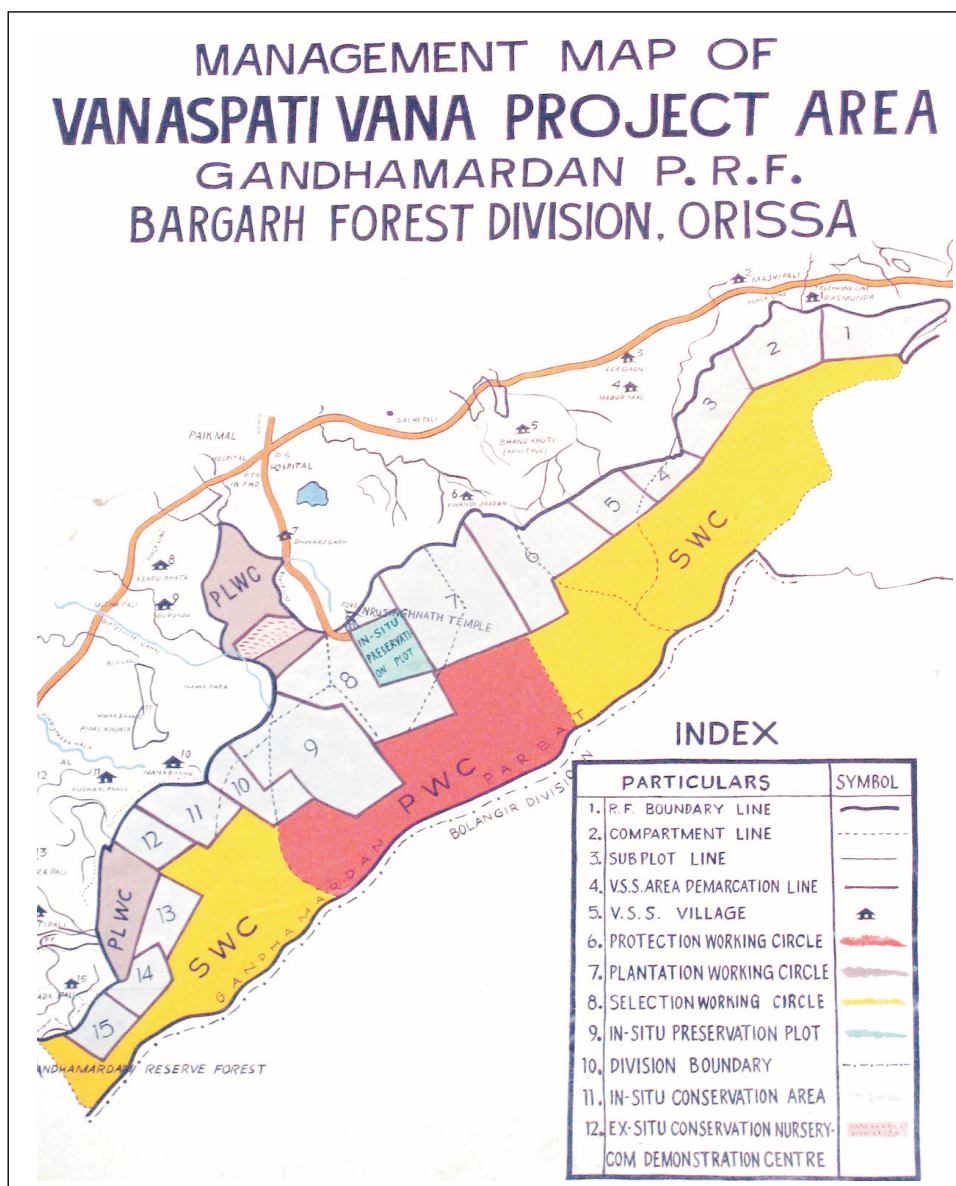
Land use naturally varies significantly over the year. Agriculture despite being the primary source of income for many households only dominates for a small part of the year after the monsoon rains and up until the December harvest. After the harvest grazing takes over the fields when animals can feed off the remaining stubble. In the summer different trees continue to be vital for livelihoods. Many forms of grasses grow on the open spaces of the revenue village. The Mahua tree is particularly important and each family tends to have its own tree somewhere within the revenue village. For the project to be able to record these shifting land uses with greater detail improved methodologies would be needed. Especially important would be the possibility to access better satellite imagery than the freely available Google Earth images. Worldview 2 is a commercial image provider which captures detailed images several times per year which could have been used if the budget and the time constraints would have allowed for it.

Forest

While a lot of work is being done to implement the Forest Rights Act which puts forest-dependent communities at the centre of control the older approach of Joint Forest Management continues. This is despite the frequent accusations that JFM tends to follow

forest department and overall government rather than community interests in its planning, management and benefit-sharing of forests (Sarap, 2007). JFM is widespread in Paikmal Block of Bargarh District including in the study villages as can be seen in the figure below where each number corresponds to a JFM village.

Figure 11: JFM at Gandhamardhan Hill



Source: Map present in the forest department office, Paikmal, in December 2011.

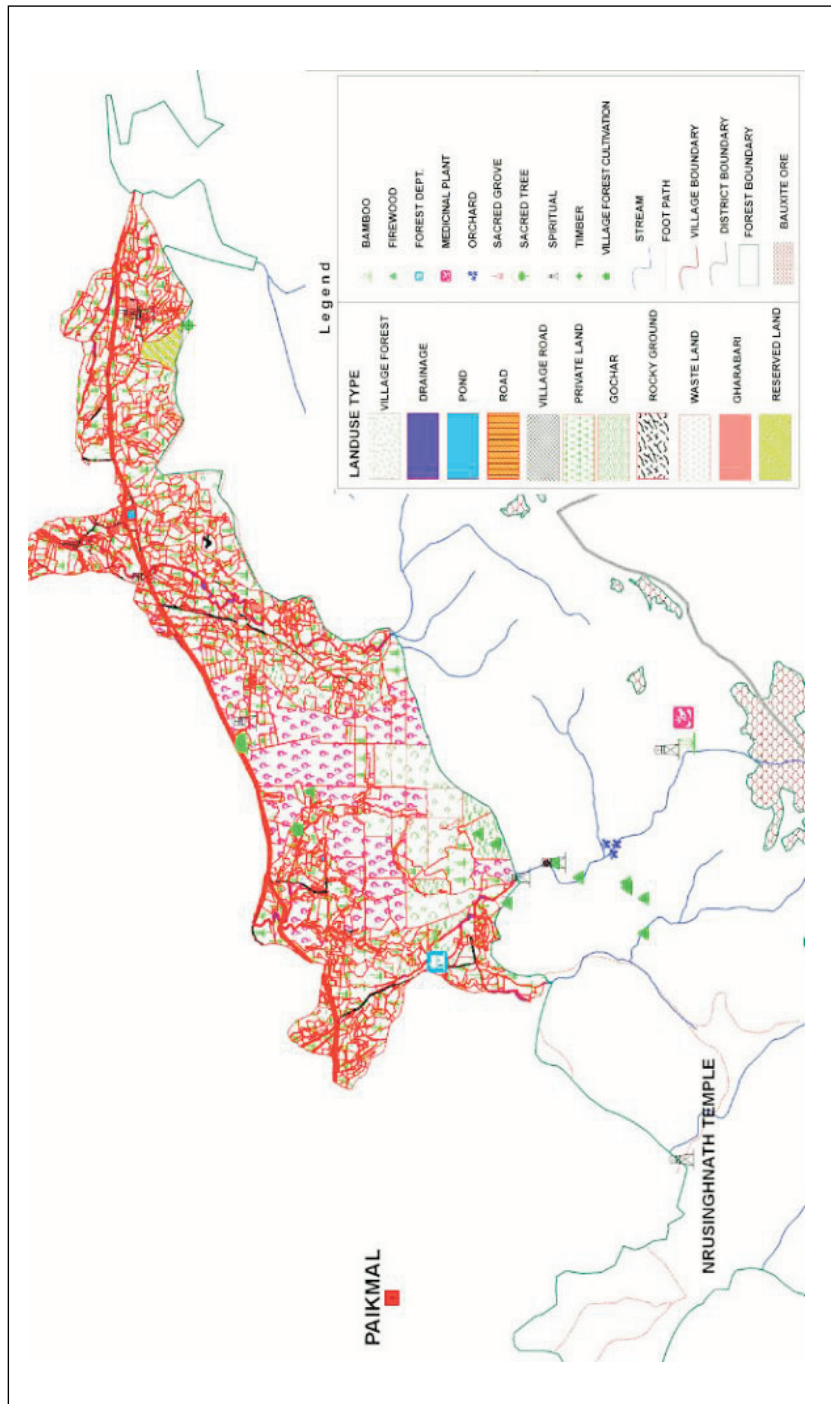
The presence of JFM in the livelihoods of villagers was found to be negligible however despite significant areas where mainly medicinal plants were grown. Households did not sell its produce to the JFM groups but to in the market or to traders apart from Kendu leaves which have special state government collection points. They also had no particular reasons for protecting the cultivations which were all on village forest land, frequently immediately next to the reserve forest. Even those who were supposedly JFM committee members themselves tended to not know about this or at the very least not be aware of any activities. Instead the committees were dominated by a few village elites and the JFM President in Paikmal.

JFM in the study villages appeared to function in ways similar to the common critique of such groups elsewhere, for the benefit of a few elites rather than as a source of livelihood for villagers. This is of course very unfortunate since the investment in medicinal plant processing and the ability to sell medicines in markets across the state are likely to generate at least some income beyond that which villagers themselves can make when selling unprocessed plants only in the local market. The well-known name of Gandhamardhan could surely be put to use in better ways in relation to medicines.

Figure 12 below shows an overview of common property and spiritual uses of revenue and forests in the study area (the map is a close-up of Figure 13 on page 62). Many of the uses take place in nearby village forests which are significant in all the villages. For daily needs villagers use the village forest and gochar land for firewood and grazing. It also contained a number of spiritually important locations. In the local forest only people from the village were allowed to enter unless special arrangements had been made with outsiders to allow extraction.

It is only for special purposes that villagers go to the reserve forest. This is especially for bamboo used for basket-making, medicinal plants, spiritual purposes and for commercial firewood collection. These uses exist throughout the year but are largely carried out only by a specialists in the villages rather than being something that every household does on a daily basis. As can be seen in the map a number of forest uses go deep into the reserve forest. Bamboo collectors walk almost to the top of the hill once per week to gather the bamboo they need. And along the same path exists a number of locations where firewood

Figure 12: Close-up of forest use in the study villages



Note: A larger version of this map is available in the Appendix.

is collected. Less than 1 km from the bauxite ore area is one of the most important local shrines dedicated to the deity Budharaja. A number of villages indicated that this was their most important religious event and as far as could be understood the shrine has existed in this special cave for generations. The Budharaja shrine is of course complemented by the nearby pilgrimage route which tens of thousands of Hindu worshippers follow every year between the two temples Nrusinghnath and Harisankar.

No cultivation takes place inside the reserve forest. This is quite surprising given the widespread dependence on forest areas at Gandhamardhan as well as such cultivation being common in other parts of Odisha. There were traces of earlier orchards in one location however indicating that at least some cultivation had taken place in the past (see Figure 12). How the orchard cultivators had been evicted and why was not possible to establish during fieldwork.

No community rights have been settled at Gandhamardhan to date as was apparent in local interviews and in available statistics in Table 1. Given the evidence in the below figure of widespread uses by many different groups of people of the reserve forest, throughout the year and reaching from the lower foot hills to the very top there are clear opportunities to demand large forest reserves of the entire hill. The challenges to implementation include the low awareness of the possibilities of the Forest Rights Act in the villages but also among movements and NGOs encountered in the area. If very few are at all aware of the Act then they will clearly not be able to demand implementation. More work is here needed by state-level NGOs and activists to spread knowledge about what the Act means and how it can be used.

At present there are many different users of the Hill from nearby villages with overlapping area access. Many villages away from the Hill also use the forest for at least some part of the year. And then there are the roaming medicinal men who come for specific plants. To decide which of all these uses should be allowed to continue in a proper institutional structure would be a real challenge before community rights can be settled. But this work needs to be started soon before any large-scale schemes of mining, religious tourism or forestry project moves in to claim large areas of the Hill ahead of communities. Already now the JFM areas have been moved out of the formal control of villagers and this might too happen with the reserve forest.

Maps for high-level policy advocacy

Although the revenue maps produced by this project could potentially be used in land reform campaigns it is assumed that the main high-level advocacy possibilities are related to forest areas. Similar maps of forests could be produced for any project discussed by the different MoEF expert committees to show detailed land use. Since forest is almost always involved in mining projects the relevance is high particularly since a number of reports detail a lack of concern for livelihoods or other local community uses on such maps (Bedi, 2013; Oskarsson, 2010).

To submit maps for advocacy purposes to for example Ministry of Environment and Forest expert committees is not at all straightforward however since there is no official public dissemination channel. At present it is only the project promoters and at times also the state government who are invited to the meetings held in Delhi. To at all know when a certain project will be discussed at such a meeting is not easy to know for activists. Nowadays the names of the individual committee members are usually listed but not with their phone numbers or email addresses which is what is required for swift submission of details. Even in relation to public hearings the official channel for submission of maps or other details is at best vague. Supposedly the local Pollution Control Board is supposed to receive written submissions which could include maps but there is little transparency in how such information is managed in the office and to what extent it is later passed on to the committee members in Delhi.

It might instead be more feasible to use maps in legal advocacy since here it is possible to request more time from the court if a map is to be produced to show a certain point. The problem with legal advocacy is that only very few are capable of engaging with it. Those with the skills to produce maps might thus not be the same people who litigate creating a capacity gap which is not easily filled.

5 CONCLUSION

This report has discussed community mapping of natural resources based on a case study at Gandhamardhan Hill in Western Odisha. In this exploratory study an attempt was made to capture the many different livelihood and cultural uses of resources which at present go undetected either due to outdated land records on revenue land, or based on a denial of rights to forests. The increasing availability of low(er) cost GIS technologies were here put to use to enable the creation of improved maps. In the project ethnographic methods and GIS techniques were combined to create a detailed set of maps of how resources are used in one part of Gandhamardhan Hill at present. The project particularly aimed to find the gaps between the official and actual uses of land in the area as a way of understanding how maps might be useful.

The well-known high biodiversity and excellent forest cover of Gandhamardhan Hill has given rise to a wide number of use of the forest. This was evident in this study both in the village forests which exists on revenue land and in the larger reserve forest on top of the Hill. Not surprisingly the forest was particularly important in the hot summer months when water scarcity prevents cultivation on the fields. While the project was unable to access forest maps of similar detail to those of the revenue land it was nevertheless possible to show a wide number of uses of the forest including spiritual uses, and the collection of NTFP, bamboo, medicinal plants and firewood all the way to the top of the Hill. It is thus clear that people depend on large areas including those where the bauxite ore exists on the very top.

The maps created by this project should give scope for demands to recognise cultivation on revenue land and forest rights both in the village and the reserve forests based on a wide number of uses. To actually make use of existing rights might be a challenge however given the widespread poverty in the area and the poor agricultural facilities where only

very few have access to irrigation and transport is a real challenge. Improved tenure rights will certainly be good for farmers but are at present not expected to be able to on their own radically improve the agricultural opportunities in the area. A strong local movement, the Gandhamardhan Suraksha Yuba Parishad, continues to exist since the 1980s anti-bauxite mining protests all around the Hill however and could possibly come to be the focal point of a new movement which aims to secure the livelihood and spiritual rights of villagers to the Hill.

Before mobilization and awareness raising campaigns can be organised locally it is likely that the maps produced by this project will be more useful as evidence of some of the possibilities afforded by mapping techniques and in higher-level advocacy. Unfortunately the national environmental approval process in India is at present not open for civil society input. Though MoEF is ahead of other Ministries in terms of information provision approvals still have very far to go for meaningful interactions. At present companies and government representatives are invited to expert committee meetings in Delhi while others have no other way than to informally trying to understand how the committee members can be contacted. The alternative process of gathering public opinions via public hearings at the proposed project site is not functioning well since such testimonies are treated as mere opinions to which project promoters can later respond in closed forums.

Participation

The hope of allowing villagers to participate in the mapping were unfortunately not possible to realise to the extent hoped for in this project for a wide number of reasons. Some of the reasons related to the way the project had been conceptualised and others due to local conditions. Certainly much more fieldwork would be required to build trust and enable meaningful exchanges between the research team and villagers. The project team was aware of the limitations in fieldwork time but had hoped to rely on local organisations for improved trust and support. When this was not possible simply since local organisations have limited staff and funds to be part of such exercises then wider participation suffered. Overall conditions were certainly not particularly conducive to participatory exercises in the forest when Maoist and state police forces kept moving in the area during fieldwork. This was despite the conscious choice of Gandhamardhan as a study area due to its historically peaceful setting as well as a lack of other contentious ongoing projects. Conditions had however changed dramatically in the area in the past few years resulting in combing operations which restricted also villagers' access to the forests.

Thinking about whether, and if so how, institutions can be designed which can properly decide on sustainable resource use have not been a part of this project. Such challenges are clearly much beyond technical mapping and livelihoods analysis given the variability and overlapping uses between groups of people, across space and time even if one was to look at only a smaller part of the Hill such as the fieldwork area in this project. And since using the forest goes much beyond individual villages to also include villages further away from the Hill, various other entities including those who come as pilgrims or to collect medicinal plants, significant work would be required to understand how arrangements might be best designed.

The future of mapping

The approach of combining a GPS and Google Earth of this project is a promising one with potential uses much beyond what is presently the case particularly for Forest Rights Act claims. This is especially the case since the law does not require the same high precision as for farm land. Further improvements could be made if better remote sensing imagery was available. A project with a larger budget than this one might thus be able to acquire images from for example the Worldview 2 satellite. Such images would not only allow for more detailed mapping but could also account for different types of vegetation. A further benefit is that images are available at multiple times per year allowing the temporal changes in vegetation cover to be analysed.

Maps to clarify land use in revenue areas could become very valuable since here there is existing maps which can be used to create very detailed maps. Overall revenue land has not been discussed as much as forests in recent literature but the problems of inaccurate agricultural land registers and unsettled forest rights exist also on this land as this project has indicated.

Given the scarcity of organisations with the skills to acquire and process maps a next step could be to establish a key knowledge centres in mapping at the state-level. These could help various groups who struggle to gain rights by providing key resources and skills locally but also to establish links to national networks for mapping advocacy. A well-connected team which could keep track of upcoming contentious projects could seemingly carry out mapping in a rapid manner for high-level advocacy. But a number of things would need to be in place before this could happen:

- The technical skill to use common GIS software to produce maps

- Access to high quality maps including those of forests, revenue and general toposheet as reference material
- The ability to access remote sensing images such as those of Google Earth to complement existing maps
- The possibility to make field visits at short notice or even prior to a forest-using project is proposed

There are a few organisations across the country who at present could be able to produce maps indicating certain possibilities to take the suggestions of this project forward. Future advocacy will of course have to determine what quality of maps will be seen as valid in proving resource uses beyond those officially recognised. At present there is no standard set for how accurate a map should be or what technical qualifications are needed from a map maker in order for the map to be seen as valid. But this will certainly change as maps become more widely adopted in civil society campaigns.

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Figure 15: Land use map for Khandijharan revenue village

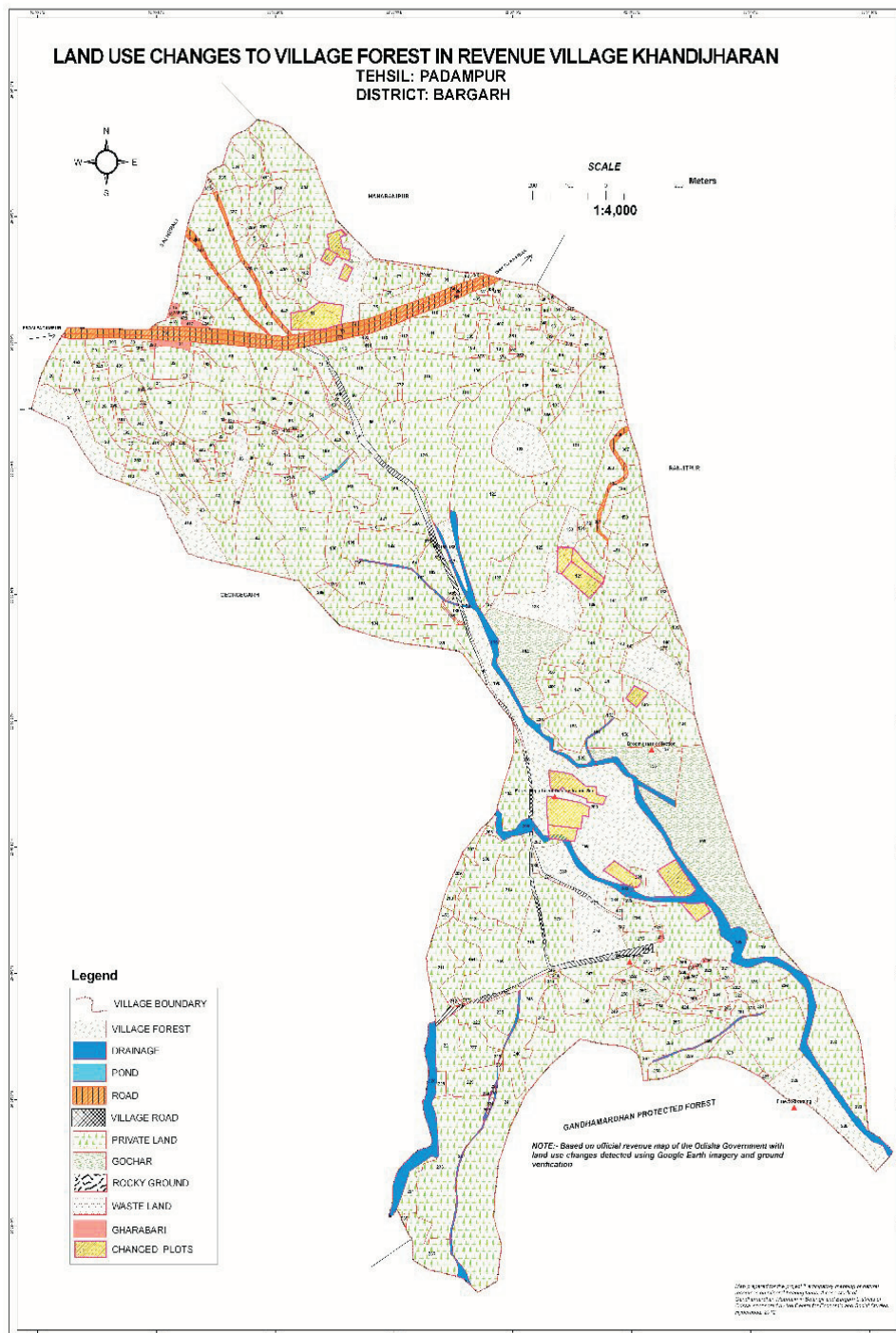


Figure 16: Land use map for Rasmunda revenue village

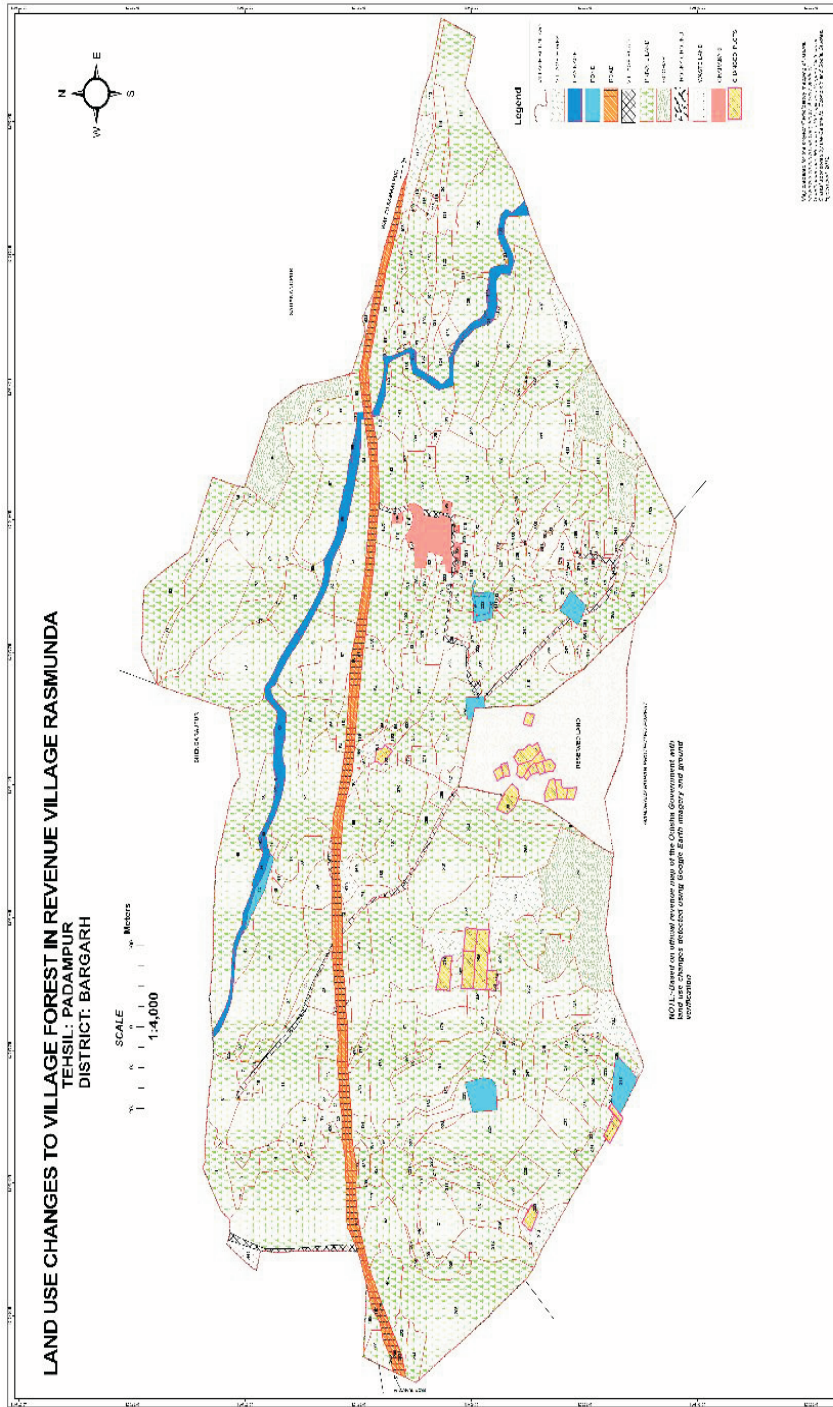
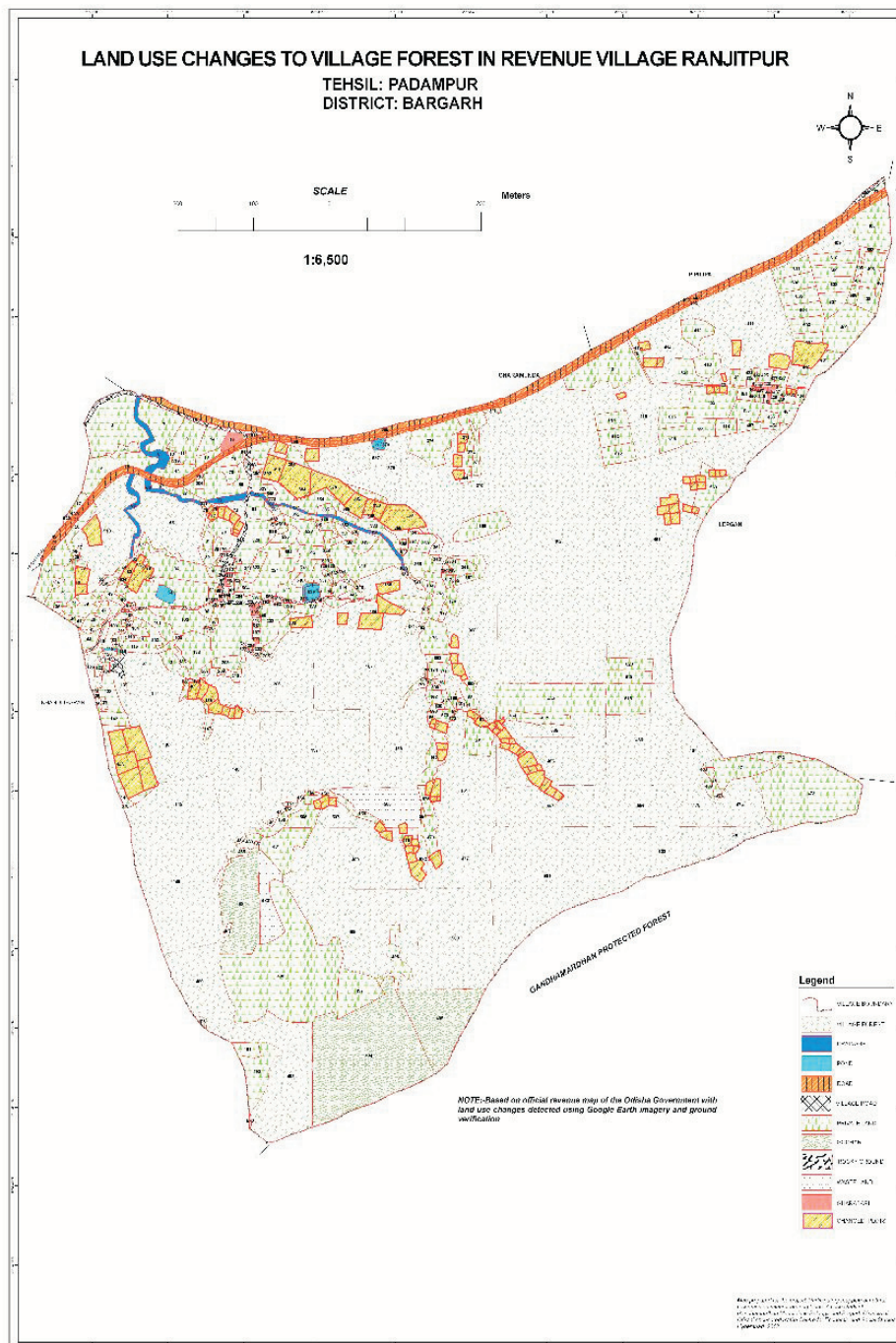


Figure 17: Land use map for Ranjitpur revenue village



About the Author

Patrik Oskarsson, Lecturer, is currently with School of Global Studies, Gothenburg University, Sweden. Earlier Patrik Oskarsson worked as an Assistant Professor at the Azim Premji University in Bangalore. His work relates to the political economy of industrialization and economic development in India. Of special interest are the various ways in which poor and marginalized groups in rural India are affected in terms of livelihoods, environmental quality and natural resource base by industrial projects, particularly in relation to mining and Special Economic Zones, but also how it is possible for the poor themselves and for public interest groups working on their behalf to mobilize and demand the implementation of rights by making use of the existing national democratic framework and, increasingly, international human rights legislation and policies for corporate social responsibility.

Patrik did his Ph.D thesis on the contestation over a proposed bauxite mining in the Scheduled Areas of Andhra Pradesh where a mining project was proposed on supposedly protected land meant to support local communities. He has since expanded his work across several states in India to also look at coal mining and power generation as well as community knowledge generation efforts. Future plans include understanding what increasing Indian import of minerals mean to other countries as well as domestically. Patrik has also worked extensively on labour rights in relation to Special Economic Zones on the outskirts of Chennai.