



The economy of the Mahanadi delta, India

Highlights

- The agriculture (crop production), livestock and fishing sectors are relatively much bigger in the Mahanadi delta than in the rest of the country (15.1% of the value added vs 11.1% for crop production; 11.7% vs 5.5% for livestock and 2.6% vs 0.8% for fisheries).
- The main skilled work in the delta is embodied in the services, while being relatively less important in agriculture, fishing and the construction sectors. The work of women is largely in activities that neither generate outputs nor intermediate inputs that contribute to external demand.
- The delta is a net exporter of agricultural land, but net importer of employment, energy and CO₂ emissions.

Introduction

The aim was to gather some insights on the Mahanadi delta on socioeconomic and biophysical context, in terms of their relations and interdependencies through the supply chain up to the final demand of goods and services at three scales: in the delta, in the country and in the Rest of the World (RoW).

We had three major objectives:

- To investigate the Distribution of Value Added in the Delta and non-Delta.
- To investigate the labour and gender embodiments in the final consumption of goods and services, both within the country (delta and non-Delta) and in the RoW.
- To examine other environmental implications, such as the land and environmental embodiments and footprints.

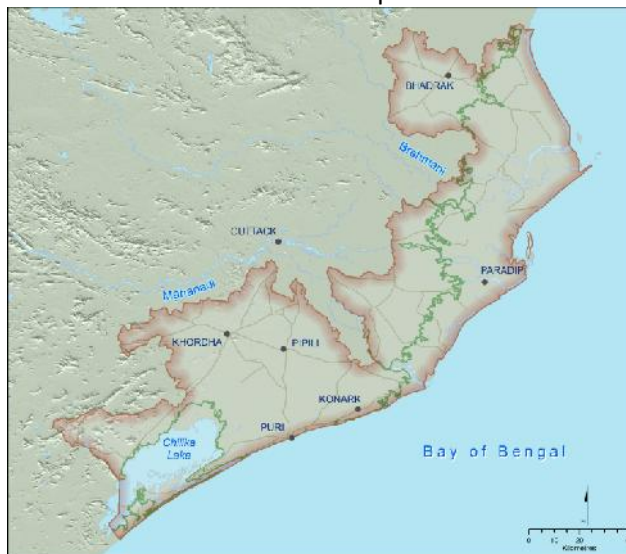


Figure 1: Location of the Mahanadi delta

Geographical Context

The Mahanadi delta is one of the largest deltas on the east coast of India. It covers an area of nearly 95,000 Km² and drains the network of three major rivers—Mahanadi, Brahmani and Baitarani—into Bay of Bengal. The coastline of the delta is about 200 km long which stretches from south near Chilika to north up to Dharma River.

According to the DECCMA definition (based on the 5m contour line), the Mahanadi delta comprises five districts (Puri, Kendrapara, Bhadrak, Jagatsingpur, Khurda) of Odisha. As per the 2011 Census the total population is around 8.03 million, of whom 76.10% are literate. In terms of employment, only 34.27% are

working in different sectors in the coastal districts and out of these 82.31% are male and only 17.69% are female.

Coastal districts of Odisha have experienced severe cyclones followed by heavy floods which adversely affected the agricultural sector and income from agriculture as well as share of Gross State Domestic product, which is declining over the years.

1. Distribution of Value Added in the Delta and Non-Delta

The general approach taken for this study is an environmentally (the socioeconomics are already there) extended input-output model. This allows studying elements such as the labour, gender, land, environmental embodiments and footprints. Figure 2 shows the shares of value added (VA) of the six major sectors (services, trade and transport, construction, industry, fishing, agriculture) and 16 categories of sectors (through aggregation from the 57 items of GTAP, version 9).

Figure 2. Distribution of Value Added by main 16 categories for the deltas.

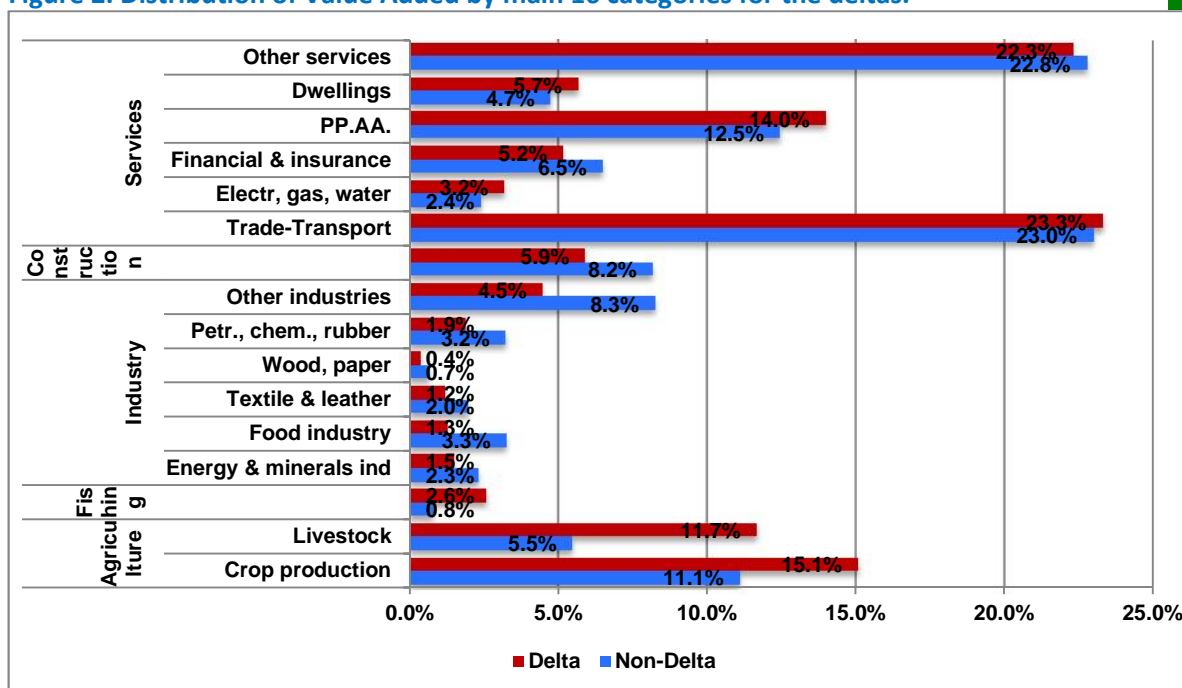


Figure 2 shows the strong importance of the agriculture sector, notably the crop production sectors, which are relatively much bigger than in the rest of the country (15.1% of the value added vs. 11.1%), livestock (11.7% of the value added vs. 5.5%) and fishing (2.6% of the value added vs. 0.8%). As a consequence of this huge size, the relative size in value added of any other activity is smaller in the delta than in the rest of the country (non-delta). In any case, the trade and transport activities, such as small business, trade, etc (activities which quite often go unnoticed when highlighting important sectors of the deltas) are revealed to be relatively more important in the delta (slightly higher than in the rest of the country), than the employment in public administrations and dwellings. On the other hand, the employment in most other services, financial and insurance and in some other industries is clearly higher in the rest of the country than in the delta. These results indicate the relative economic underdevelopment of this delta.

2. Labour and gender embodiments

Figure 3 shows the relatively modest contribution of the delta demand in the non-delta employment (as it is a smaller area, while the employment in India is estimated for 2011 as 457,878K people). Still, in absolute terms it represents an employment of 1,608K people to satisfy the goods and services demand in the delta. On the other hand, we observe on the right hand side how the employment in the delta (2,488K people) has an important proportion (around 35%)

that is originated to satisfy the final demand of the non-delta, while a much smaller proportion (less than 10%) that is originated to satisfy the final demand of the Rest of the World. Figure 3 shows the distribution by sector of that employment of the delta, showing that the employment in the delta has as main destination the satisfaction of the final demand within the delta itself (2,146K people, around 50%), notably in services (909K people), agriculture and forestry (564K people), and manufactures & mining (390K people). In the case of services, an important number of workers (501K people) satisfy the final demand in the Rest of the World. Manufactures and mining (464K people) satisfy the final demand in the non-delta, while Fishing (only 145K people, dominate employment to satisfy the final demand of the delta itself of 38K people) and energy satisfies the final demand of the delta itself of 20K people.

Figure 3. Employment of the delta by demanding region and sector

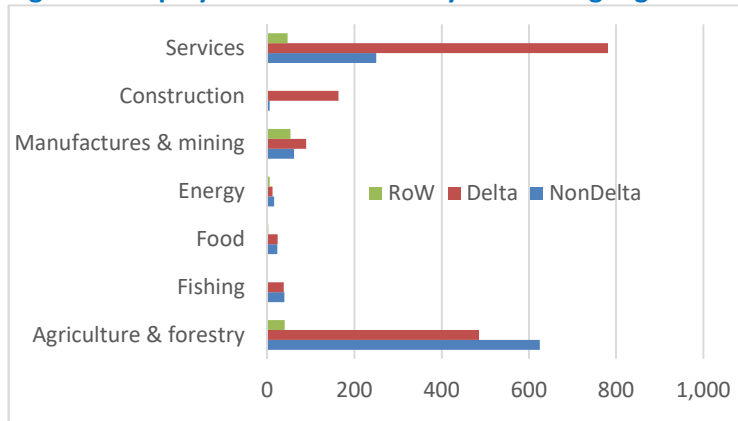


Figure 4. Direct and embodied labour of the delta by sector

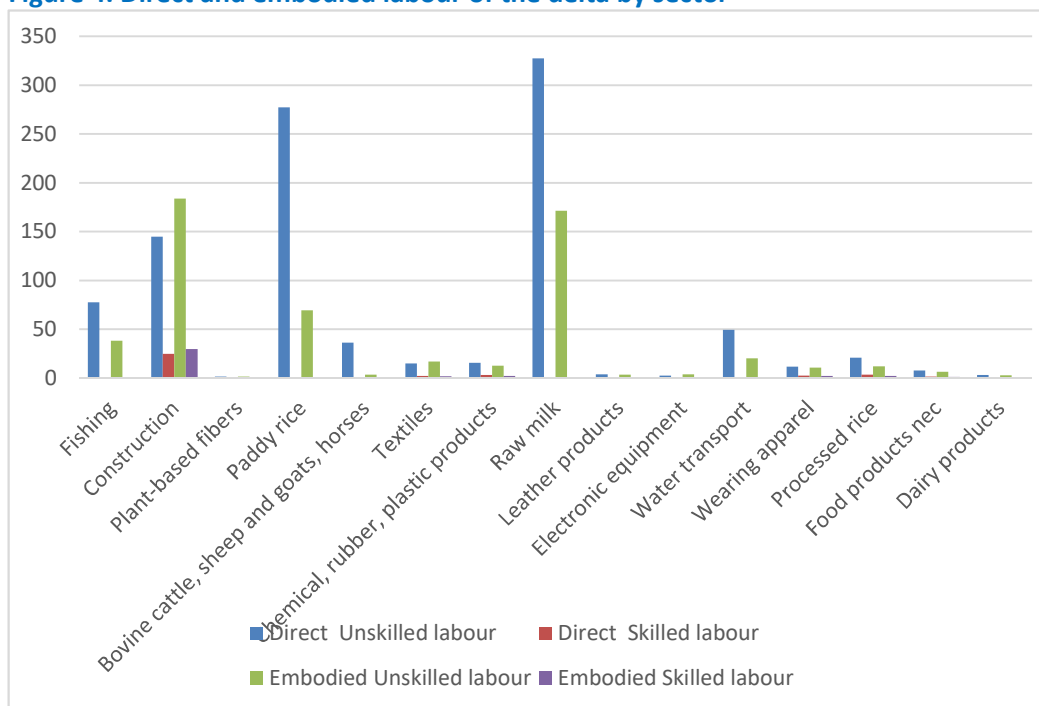
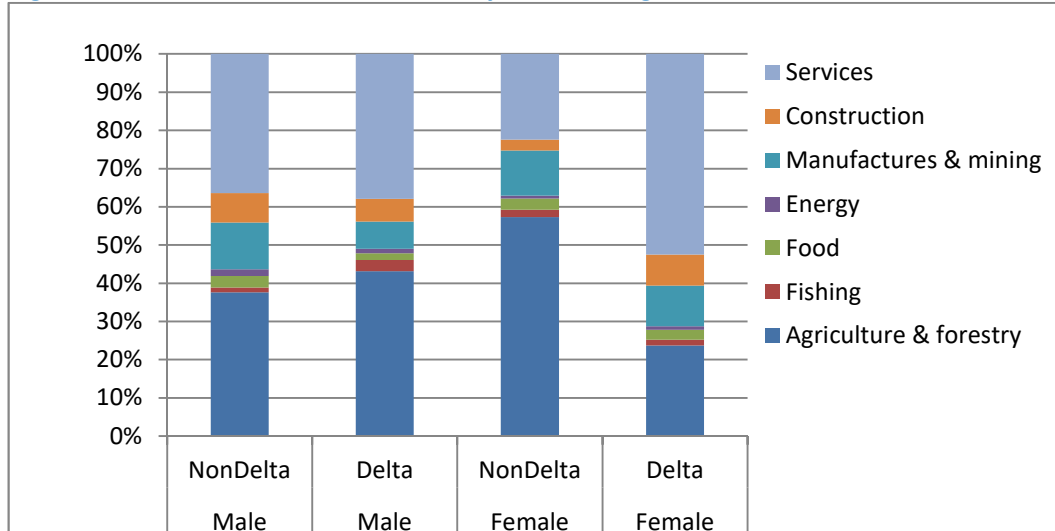


Figure 4 extends the insights obtained in Figure 3, with a sectoral and skill type detail (according to GTAP classification). In particular, we may observe the particular relevance of the embodied (directly and indirectly) employment in construction, mostly unskilled, on the raw milk, paddy rice and fishing sectors.

Figure 5 extends the insights obtained in Figures 3 and 4, by providing the gender detail of this employment. Figure 4 shows that the work of females satisfies directly and indirectly less the final demand abroad (both in the non-delta and in the Rest of the World) than the work of males. In Figure 5 we observe the embodied work of women in the delta mostly in the services, manufactures and fishing, and also in the construction sectors, while being relatively less important in agriculture, energy.

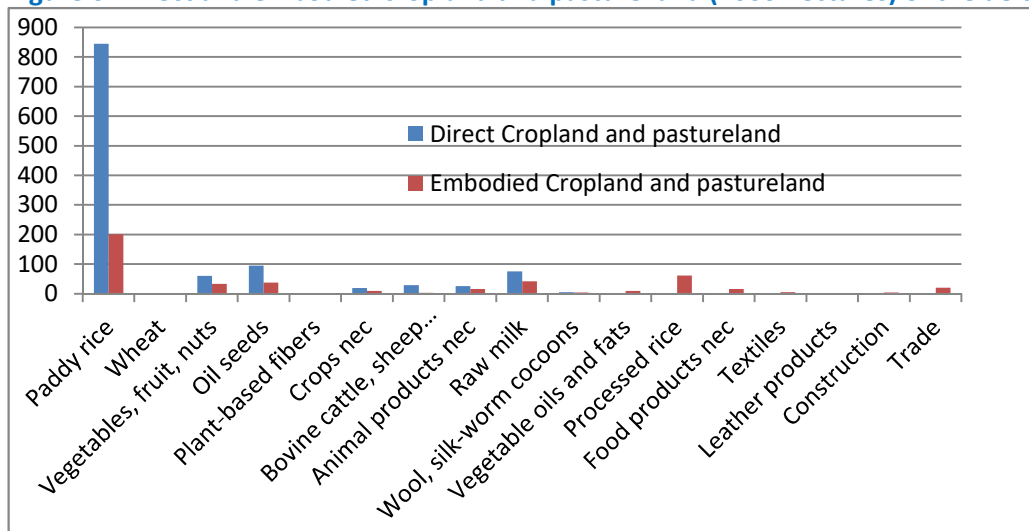
Figure 5. Direct and embodied labour by sector and gender in the non-delta and delta



3. Land and environmental embodiments and footprints

The environmental extension allows for the computation of many embodiments and footprints, which we illustrate, as an example, for the case of land use (in physical units). Figure 6 shows the embodiment of agricultural land of the delta in the demanding regions (delta; non-delta and Rest of the World). The direct agricultural land use is clearly dominated by paddy rice (close to a million hectares), but this changes enormously when we look at the embodied agriculture land in the final demand of goods and services. In particular, we may observe how the embodied land use in the processed rice, cereal grains, oilseeds, vegetables and fruits, raw milk and trade is non-trivial, mostly occurring to satisfy the (exports) final demand of the non-delta (also partly the RoW).

Figure 6. Direct and embodied cropland and pasture land (1000 hectares) of the delta



Implications and recommendations

The input-output (IO) table and model show and use the interdependencies through the supply chain up to the final demand of goods and services in the delta, in the country and in the Rest of the World. As a consequence of strong importance of the agriculture sector, the relative size in value added of any other activity results smaller in the delta than in the rest of the country (non-delta), implying the relevant economic underdevelopment of this delta.

Due to this underdevelopment of the delta, there is a need for continued investment in the agricultural sector and concentration on adaptation activity so that people of the delta are able to earn their daily necessities. The policy development pathway should start with agricultural sector. Commercially viable and climate appropriate agricultural product diversification may be a good option for employment generation.

Adverse climatic impact on agricultural activities also has adverse impact on trade and related employment opportunities. This is again another manifestation of over dependence on agriculture in the delta.

In the non-delta, the construction and manufacturing and mining sectors have more share of employment than in the delta, while less in agriculture, which is the main pool of labour of unskilled work. So Labour intensive developmental work and creation of requirements of skilled labour will be able to prevent out migration from the Delta. Agro- based and off-farm economic activities can be initiated in this respect.

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References

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About DECCMA Policy Brief

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The policy brief intended to share initial findings and lessons from research studies commissioned by the program. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hotspots. As an interim output of the DECCMA project, they have not undergone an external review process. Opinions stated are those of the author(s) and do not necessarily reflect the policies or opinions of IDRC, DFID, or partners. Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.



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