A framework for the Integrated Assessment of SDG trade-offs in the Sundarbans Biosphere Reserve.

Charlotte L. J. Marcinko, Robert J. Nicholls, Tim M. Daw, Sugata Hazra, Craig W. Hutton, Chris T. Hill, Derek Clarke, Andy Harfoot, Oindrila Basu, Isha Das, Sandip Giri, Sudipa Pal and Partho P. Mondal

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Sustainable Development Goals (SDGs)

United Nations 2030 Agenda for Sustainable Development

- 17 Sustainable Development Goals (SDGS)
- 169 targets
- Urgently needed to shift the world to a sustainable and resilient path.

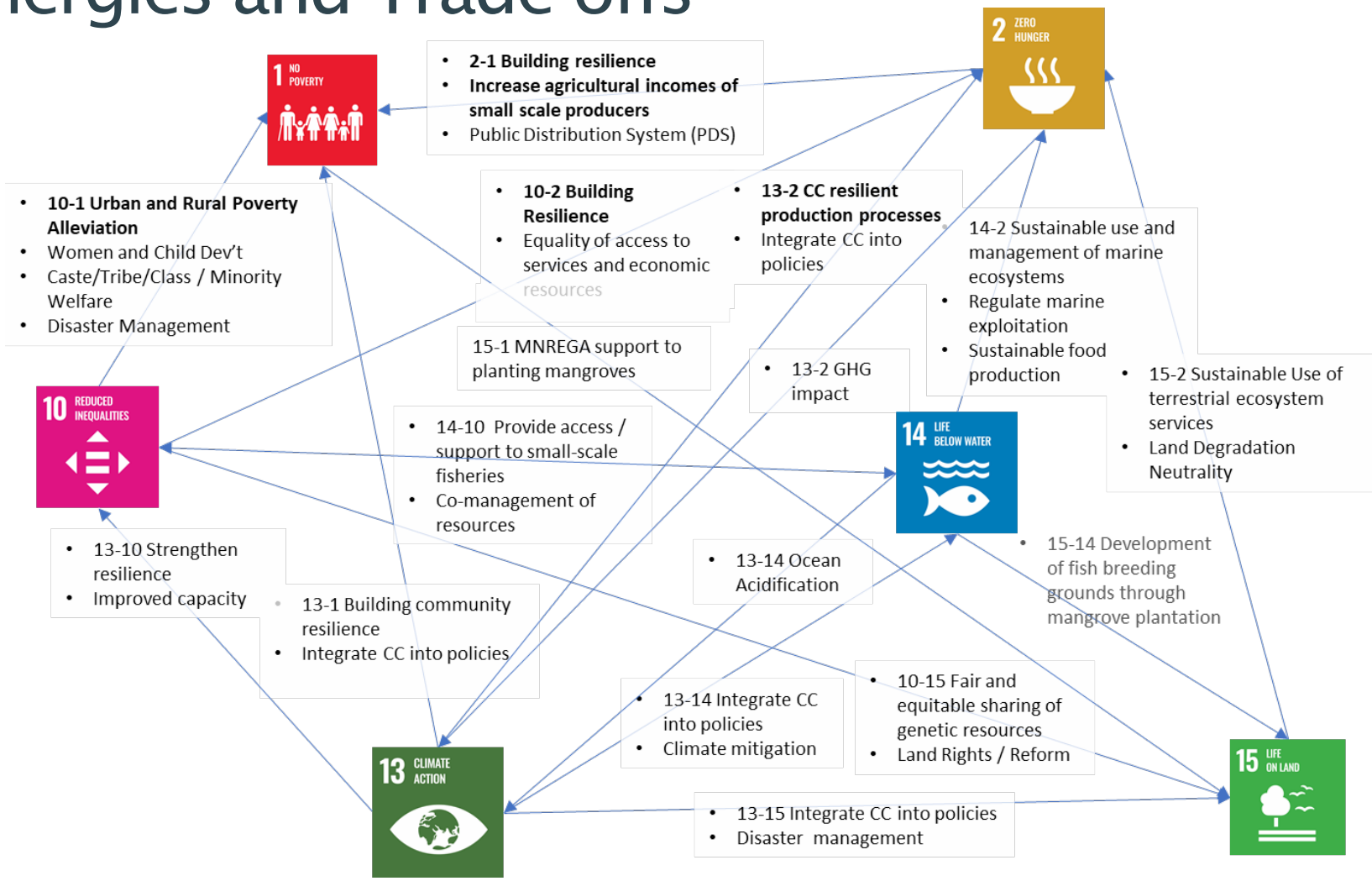
SDGΔ Project Aim: Build on earlier delta research and explore development trajectories, trade-offs and choices raised by six (of the 17) SDGs:

SDG Interactions: Synergies and Trade-offs

Interactions can lead to interventions which have synergies and trade-offs between SDGs.

Understanding synergies and trade-offs is critical to achieve the 2030 Agenda

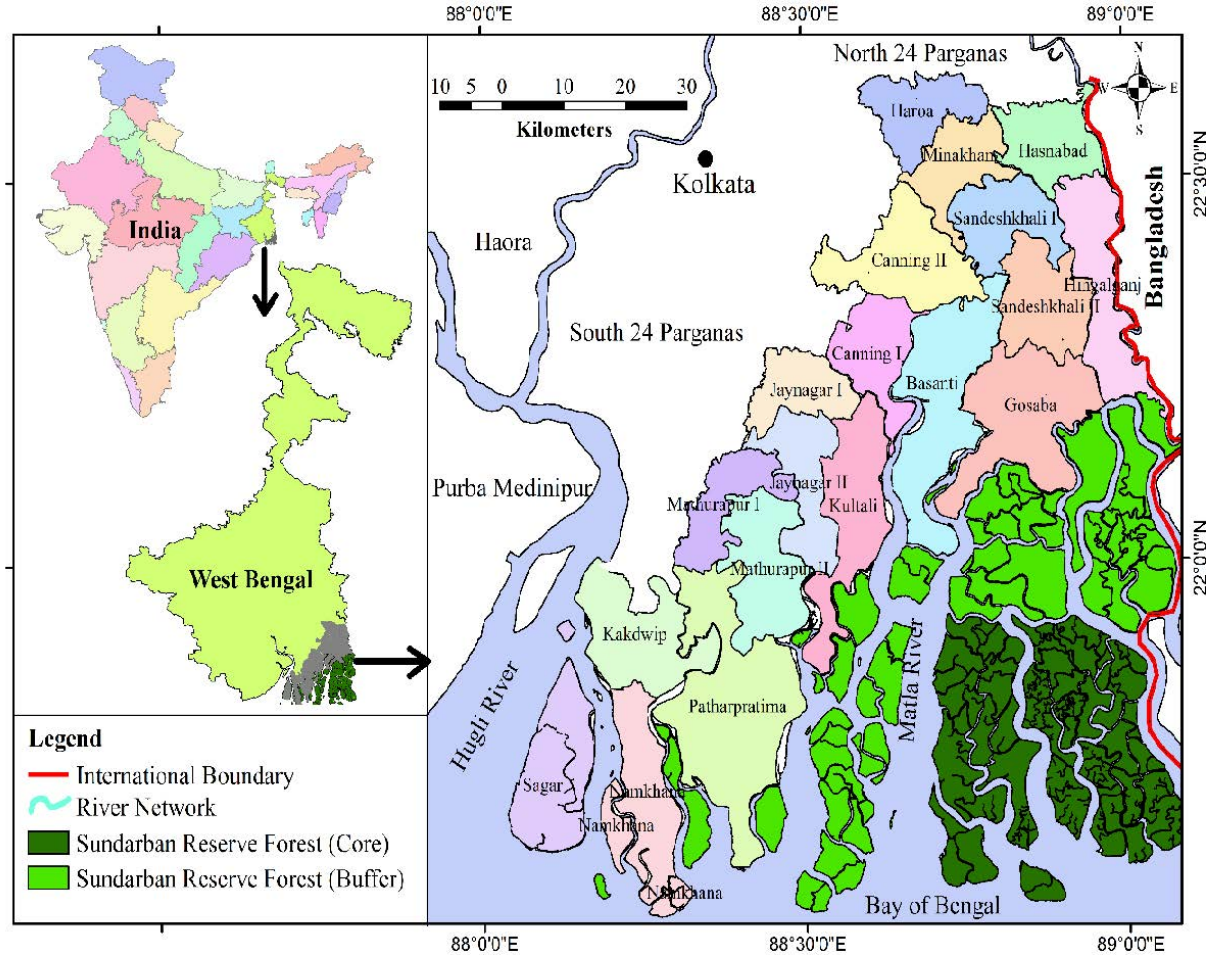
We are developing a framework to identify and analyse relationships between SDGS and the links to policy at a **sub-national and regional scale**.



Example of the relationships between SDGS and links to potential policy interventions

Study Area: Sundarbans Biosphere Reserve (SBR)

- Area of 9630 km^2 covering the Indian Sundarbans on the Ganges Delta
- UNESCO World Heritage Site
- Region of ecological importance
  - Large mangrove forest
  - Home to 96+ tigers
  - Biodiversity hotspot



Map of study area

Study Area: Sundarbans Biosphere Reserve (SBR)

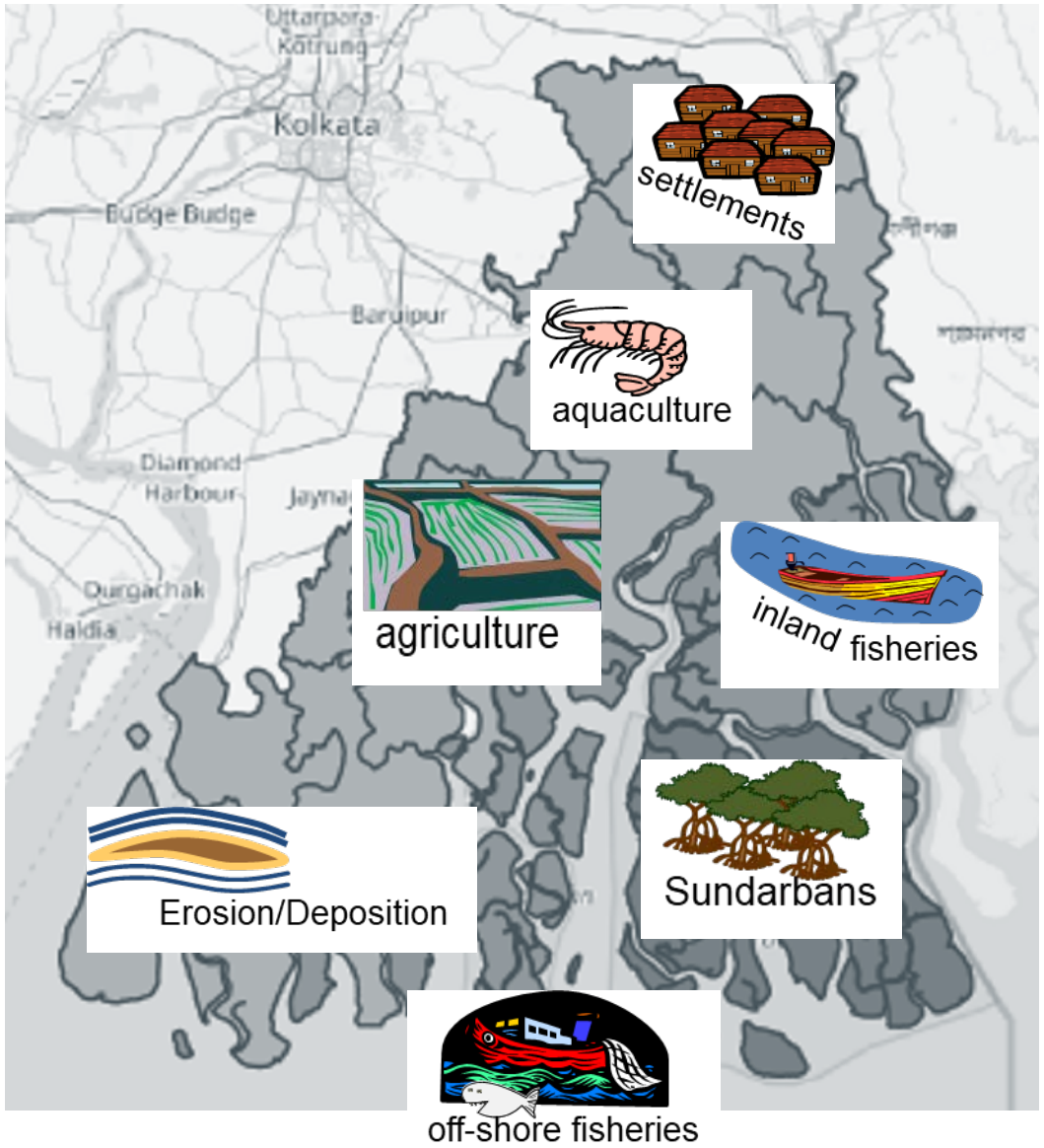
- Home to > 5 million people
- 32 % live below the poverty line
- 60 % of workers depend on agriculture
- Fisheries is an important occupation
- Increasing conversion of land to aquaculture

Important livelihoods in the SBR:
Agriculture, Fisheries and Aquaculture

Drivers of Change in the SBR

- Exogenous factors
  - e.g. Climate Change, Natural Hazards, Upstream river management, Macro-economics (e.g. globalisation, technological change) etc.
- Endogenous factors
  - e.g. Ground water withdrawal, population change, Subsidies, Infrastructure development, Conservation etc.

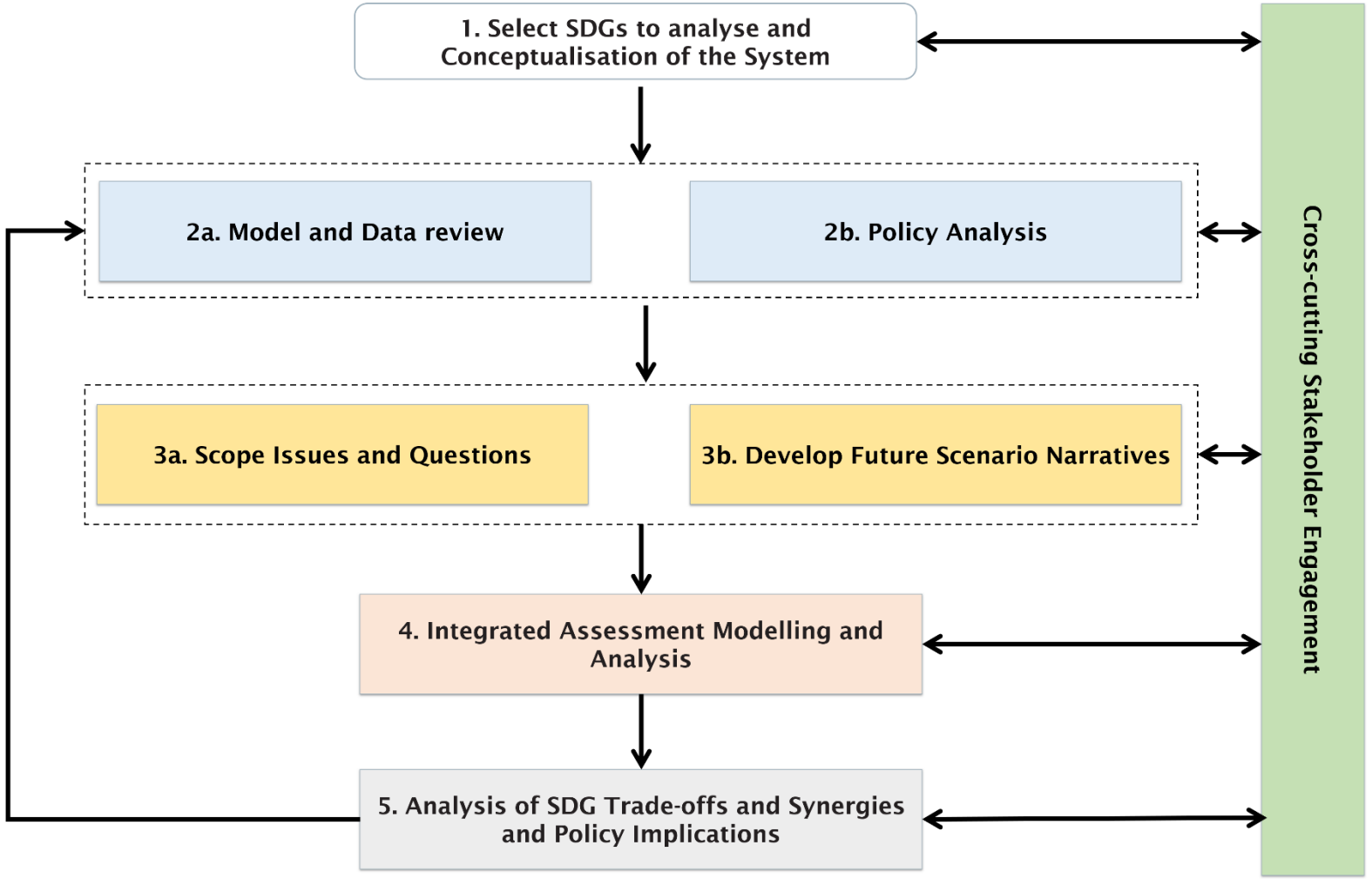
Exogenous and endogenous drivers, influenced by government policy, impact land use and land cover within the SBR and drive changes in the livelihoods and wellbeing of local communities.



Example of Land Use/Land Change Processes in SBR

Participatory Approach

- Steps of the approach being taken to analyse SDG trade-offs and synergies in the Sundarban Biosphere Reserve.
- We have developed a framework for the Integrated Assessment Model to be used in step 4.



Steps of the integrated assessment approach used to gain system specific knowledge of human-natural processes and their interlinkages for the purpose of assessing interactions in specific SDGs.

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Conceptualisation of the system: Identifying key drivers of change within the SBR

- In person workshops with local government, NGOS and community leaders
- Identified key drives that will affect sustainable development in the Sundarbans Biosphere Reserve
- Identified the perceived importance of these drivers and how they may change into the future

Word cloud of the frequency of mention of variables that were reported to influence another variable in workshop causal diagrams and expert interviews. “land ho” refers to land holdings.

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Identifying Key Policy Areas

- Used policy analysis and stakeholder participation to identify key issues of interest where there are likely synergies and trade-offs in policy areas.
- Identified methods and data that would allow examination of these areas.

Summary of key issues to explore within the SBR, their links to SDGs and current policy, and overview of the type of methods and data available for analysis.

Areas for Exploration	SDGs Considered	Links to Policy Initiatives	Overview of methods and data available
Increased provision of freshwater		Soils health[1,2], increase efficiency of irrigation[3], encourage diversification of high value crops[4], doubling farmers incomes[2,5], rainwater harvesting[6,2]	Agricultural modeling, mangrove health indicators, Statistical poverty modelling, socioeconomic data, livelihood information.
Aquaculture expansion		Control of land use change[7], support for sustainable agriculture[8,9], regulate growth of inland aquaculture, diversification of species in freshwater aquaculture[10], triple export from fisheries and aquaculture sector[11,12], double income of fishers and fish-farmers[7]	Land use land cover modelling, agricultural modelling, aquaculture sector knowledge and trends, statistical poverty modelling, livelihood information.
Mangrove trends, including realignment/retreat		Rehabilitation and regeneration of mangroves[13], riverbank afforestation[14], sustainable management, ecotourism[15], coastal resilience[2]	Mangrove extent modelling, mangrove health indicators, land use land cover modelling, fisheries sector knowledge and modelling.

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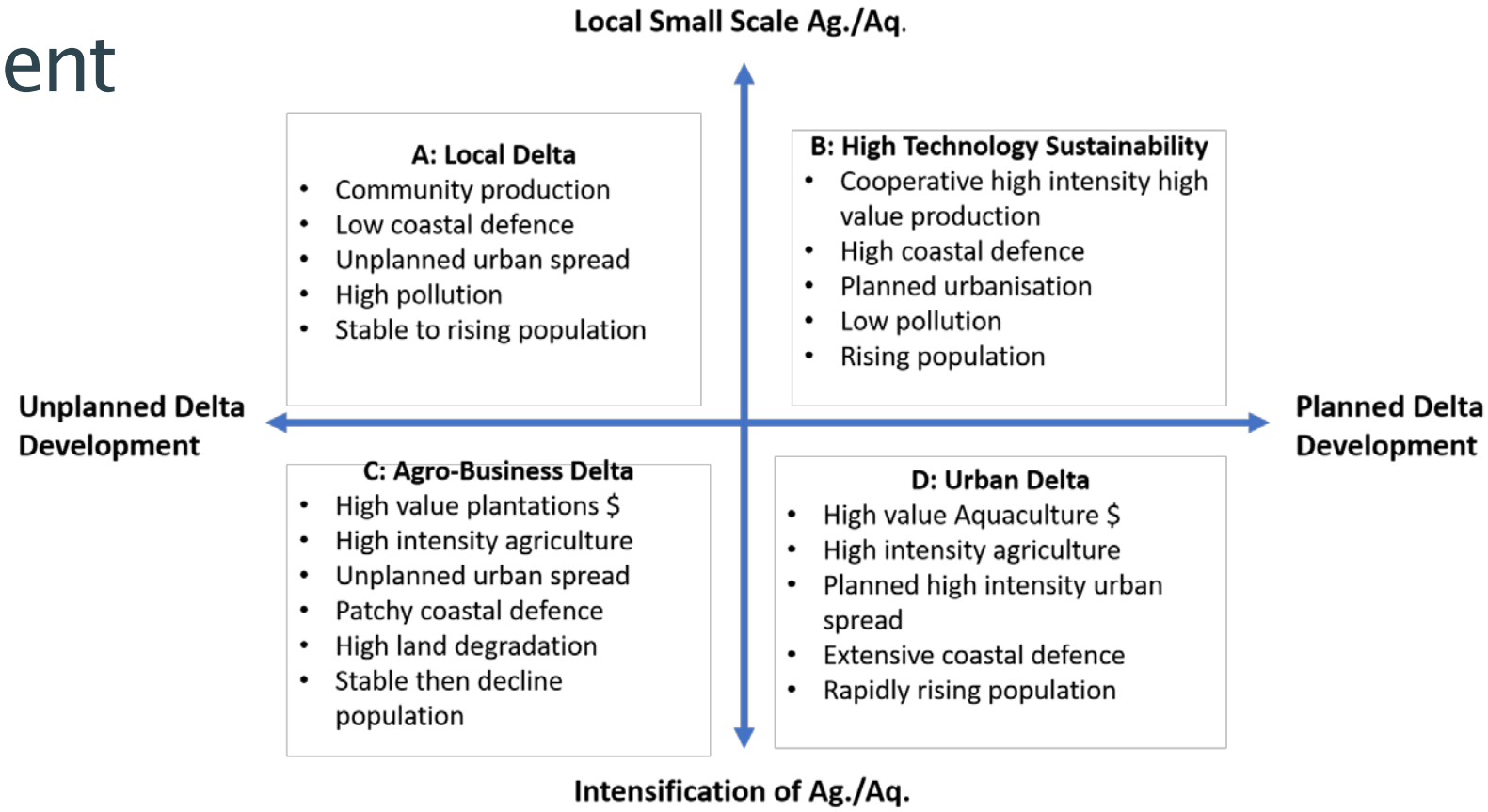
Model and data Review

- Extensive review of modelling capability and data available for analysis of the SBR
- Indicated which aspects of the system could be accurately represented within our analysis and over what time periods
- Collated information from previous research programs along with the wider literature and public data archives.
- Found >80 biophysical and socioeconomic datasets and models across 15 sub-categories (e.g. Climate, Ocean, Hydrology, Economy, Infrastructure and Access etc.)

Scenarios of Development

- Online workshops with stakeholders to develop Four scenarios of change to address future uncertainty in development.

- Scenarios based on land use choices as this was identified as a significant issue that lies at the centre of trade-offs between SDGs in the SBR.



Future scenarios for the SBR region aligned against axes of uncertainty surrounding the intensity of agriculture and aquaculture production and the degree to which delta development is planned or unplanned.

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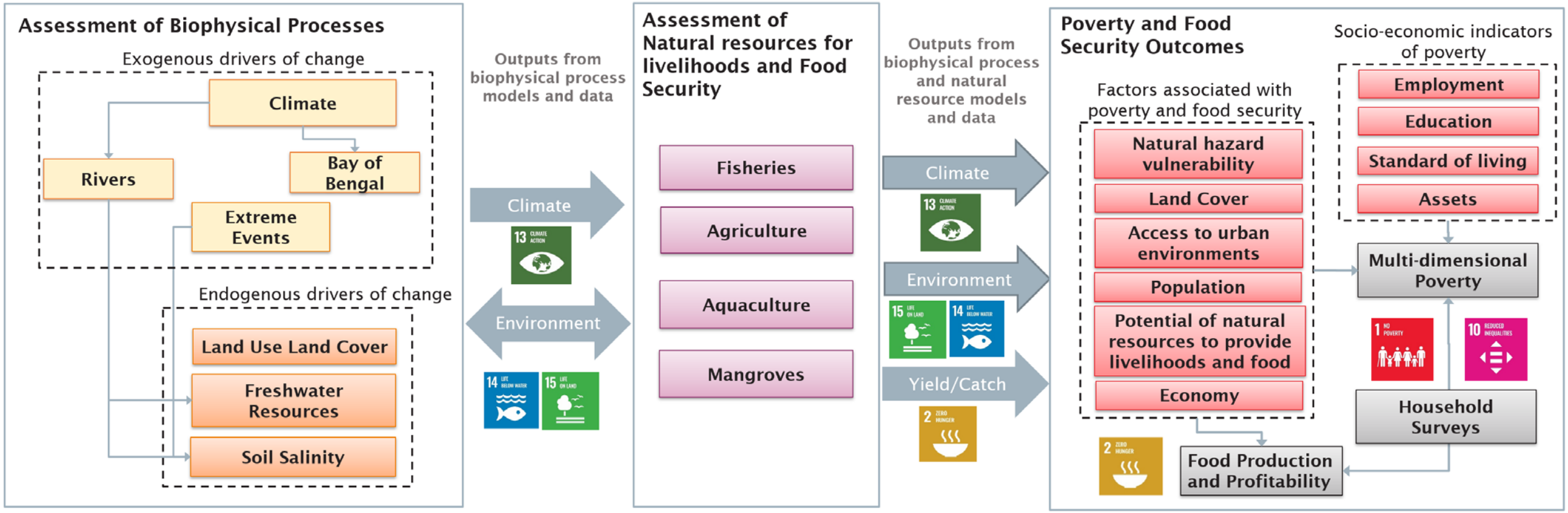

Proposed IAM framework for the integrated assessment of the interactions and trade-offs of selected Sustainable Development Goals within the Sundarban Biosphere Reserve. Boxes represent subcomponents where models and /or data are available for analysis. Arrows indicate information flow between subcomponents. Colors are used to group subcomponents and aid visualization. Yellow = factors acting as endogenous drivers of change, orange = endogenous drivers of change, purple = models of natural resources linked to livelihoods, grey = socio-economic analysis, pink = factors feeding into socio-economic analysis coming from other subcomponent analysis, scenarios and data.

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Positives of the approach and framework

- Framework contains key processes that are of interest to stakeholders.
- Allows future environmental change and policy choices to be explored in terms of their impacts on SDGs.
- Sub-national level focus recognizes the complexity and uniqueness of different social-ecological systems (SES)
- Ability to provide new understanding of local level implementation of SDG-driven national/state level policy.
- Approach can be applied in other deltas and more broadly to other Socio-ecological systems

Challenges and limitation:

- A lack of the region-specific data required to dynamically model several processes of interest.