

Management of Natural Resources  
in the Coastal Zone of Soc Trang Province

## Integrated Coastal Area Management in Soc Trang Province

Timothy F Smith, Steve Gould, Dana C Thomsen



Published by **giz** Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH



Soc Trang Provincial  
People's Committee

Published by

Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

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## **Integrated Coastal Area Management in Soc Trang Province**

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March 2013

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## **Executive summary**

Integrated Coastal Area Management (ICAM) is a contemporary governance framework for the achievement of sustainable social-ecological systems in the coastal zone. ICAM approaches recognise the importance of functioning and healthy social and ecological systems in the development of sustainable coastal livelihoods and improving the quality of life of people in coastal areas. While ICAM is focused primarily on the coastal zone, it also recognises that coastal areas are transitional zones and are influenced by both marine and catchment processes.

The key principles that guide ICAM include:

- Integration of sectors and agencies;
- Participation and co-management;
- Ecosystem-based management; and
- Adaptive management. ICAM is underpinned by a commitment to ongoing learning and improvement through effective engagement, capacity building, and co-learning. ICAM is also known by several other acronyms such as ICM (Integrated Coastal Management) and ICZM (Integrated Coastal Zone Management). For consistency, the term ICAM is used throughout this report.

The purpose of this report is to contribute to ICAM in Soc Trang Province. Coastal areas in Vietnam (such as Soc Trang) have been identified as vulnerable to the impacts of climate change (see for example Chaudhry and Ruyschaert, 2007). The project was supported through the GIZ-Project in Soc Trang and included three stages:

- A review of literature relevant to ICAM in Soc Trang;
- The conduct of a 2-day systems and futures workshop with representatives from Various Soc Trang sectors; and
- Key informant interviews and surveys to identify capacity issues.

### ***Key findings***

- Sustainable coastal livelihoods are a shared and preferred vision for the future among sectors.
- Cross-cutting barriers to addressing priority coastal issues included:
  - Poverty/income/funds;
  - Public awareness/education;
  - Human capital;
  - Monitoring.
- Perceptions among Soc Trang stakeholders that human and social capital are the most critical capacity issues for ICAM in the province.
- Education, awareness raising and capacity building are the preferred mechanisms to underpin the successful implementation of ICAM.
- High levels of human and social capital have been enhanced through donor programs such as GIZ and also other knowledge exchanges with other countries.
- Persistent and low levels of financial and built capital exist in the province.

## ***Implications for ICAM***

The overarching focus on sustainable livelihoods provides:

- Abroad contextual framework that allows evaluation of all dimensions of sustainability;
- An opportunity to develop coastal management strategies cognisant of drivers and impacts at the system scale
- A rationale for all sectors within the system to contribute to the development of coastal management strategies towards the integration of diverse needs and aspirations.

The consensus on sustainable livelihoods as a shared vision and the central role of education, awareness raising, and capacity building in achieving this, also allows communities to proceed to the determination of where and how to apply these tools for maximum effect. Mapping and communicating the broad contextual framework (i.e. charting important system dimensions) is an important first step in identifying where each of these tools may be applied within existing structures. The systems conceptualisation developed through this study indicates that education, awareness raising and capacity building strategies for ICAM will need to be developed concurrently with mechanisms to build human and social capital within the province more generally.

It is also important to note that consensus on the shared, higher-level, vision of sustainable livelihoods does not preclude the development of a diverse range of localised strategies for achieving this goal. Diverse, but complementary, strategies can lead to more sustainable outcomes at local and regional levels in the longer term. For example, diversified strategies offer greater opportunities for switching between strategies and ensuring less dependence on any one strategy across a range of socio-ecological dynamics and extended time frames.

Comprehensive assessment of the sustainability of particular strategies, across spatial and temporal dimensions, will assist in the development of a portfolio of mechanisms to achieve community goals without creating negative path dependencies and limiting future options. For example, tourism is increasingly identified as one mechanism through which coastal communities in South East Asia can augment incomes. While tourism may increase incomes for some sectors within the region, a participatory systems approach can help identify the advantages and disadvantages across the entire system. Broader issues such as increased impact upon ecological systems, transport networks, and cultural norms can then be assessed alongside potential economic gains—providing a more accurate assessment of the sustainability of various options.

Finally, the focus on sustainable livelihoods facilitates dialogue and debate on community values and goals. Sustainable systems meet diverse community needs now and into the future; they are cognisant of, and responsive to, the impacts of other systems whilst maintaining their core objectives.

## ***Recommendations***

- Ensure that the preference for sustainable livelihoods remains a key focus for ICAM mechanisms (e.g. through communication emphasis and engagement strategies).
- Approach ICAM as an adaptive learning process through comprehensive monitoring and evaluation (of on-ground outcomes and changes to adaptive capacity – particularly in terms of social and human capital).
- Donor assistance is perceived by stakeholders to have had significant impacts on human and social capital in the province. While donor-reliance should be avoided, there is a rationale for the sharing of global resources within a globalised society—in particular, when addressing global-scale problems that may lead to localised consequences. Hence, there are many opportunities to build on past and continuing donor efforts, while ensuring adequate capacity for self-determinism in engagement processes.
- Develop mechanisms to enhance localised contributions to human and social capital to ensure self-reliance and self-determinism in the longer term. For example, link educational

and awareness raising strategies to capacity building efforts more generally using a broad sustainability framework and participatory approaches to adaptive management.

- Work with local communities to develop a suite of alternative and sustainable livelihood strategies that builds on existing strengths. A critical aspect of this is the avoidance of path-dependencies that may arise from the implementation of various ICAM initiatives.

## Table of content

<b>About GIZ in Viet Nam</b> .....	<b>i</b>
<b>Executive summary</b> .....	<b>ii</b>
<b>Table of content</b> .....	<b>v</b>
<b>List of Tables</b> .....	<b>vi</b>
<b>List of Figures</b> .....	<b>vi</b>
<b>1. Introduction</b> .....	<b>8</b>
<b>2. Aim and objectives</b> .....	<b>8</b>
<b>3. Methods</b> .....	<b>8</b>
<b>3.1 Desktop review</b> .....	<b>9</b>
<b>3.2 Systems and futures workshop</b> .....	<b>9</b>
3.2.1 System Conceptualisation .....	10
3.2.2 Futures Studies concepts and methods .....	11
<b>3.3 Adaptive capacity assessment</b> .....	<b>15</b>
<b>4. Soc Trang contextual analysis</b> .....	<b>17</b>
<b>5. Results</b> .....	<b>20</b>
<b>5.1 Systems model</b> .....	<b>20</b>
5.1.1 Examples of direct and indirect flow-on effects of ICAM issues .....	20
5.1.2 Examples of direct and indirect causes of ICAM issues .....	23
5.1.3 Drivers, Relays and Impacts .....	27
5.1.4 Examples of feedback loops among ICAM issues .....	29
5.1.5 Priority issues and perceptions of capacity .....	29
<b>5.2 Applied futures studies</b> .....	<b>32</b>
5.2.1 Mapping the Future' through the Futures Triangle .....	32
5.2.2 Creating Alternatives' through Scenarios .....	36
5.2.3 Creating Transformations' by Visioning and Back Casting .....	39
<b>5.3 Adaptive capacity assessment</b> .....	<b>41</b>
<b>6. ICAM implications</b> .....	<b>43</b>
<b>7. Recommendations</b> .....	<b>44</b>
<b>8. Conclusions</b> .....	<b>45</b>
<b>References</b> .....	<b>46</b>
<b>Appendices</b> .....	<b>50</b>
Appendix 1: Example of map used to stimulate systems thinking .....	50
Appendix 2: Key informant interview questions .....	51
Appendix 3: Futures triangle results .....	52
Appendix 4: Scenarios .....	57
Appendix 5: Visions .....	62
Appendix 6: Back Casting Card Results .....	64



## List of Tables

Table 1: Summary of Soc Trang characteristics .....	17
Table 2: Contributions to GRP (in VND) of various sectors in Soc Trang from 1992 to 2010 .....	17
Table 3: Projected changes to the contributions to GRP of various sectors in Soc Trang from current levels (2010) to 2015 and 2030 .....	19
Table 4: ICAM Drivers, Relays and Impacts .....	28
Table 5: Priority issues and perceptions of capacity for the agriculture and rural development sectors .....	30
Table 6: Priority issues and perceptions of capacity for the aquaculture sector .....	30
Table 7: Priority issues and perceptions of capacity for the planning/coordination and environment sectors..	31
Table 8: Priority issues and perceptions of capacity for the districts .....	31
Table 9: Priority issues and perceptions of capacity for other stakeholders.....	32
Table 10: Futures Triangle Results.....	33
Table 11: Ease of change .....	35
Table 12: Collapse and Preferred Scenarios .....	36
Table 13: Main ICAM scenario thematic.....	37
Table 14: Main priority action by scenarios .....	38
Table 15: Example thematic visions for Soc Trang ICAM in 2025 .....	39
Table 16: Back casting actions for ICAM 2025.....	40

## List of Figures

Figure 1: ICAM project stages and outputs .....	9
Figure 2: Anticipatory Action Learning Approach (Inayatullah, 2007).....	12
Figure 3: Futures process.....	13
Figure 4: The Futures Triangle .....	14
Figure 5: Possible scenario for ICAM in Soc Trang.....	14
Figure 6: Foundational Futures Questions .....	15
Figure 7: Adaptive capacity enabling or constraining implementation of ICAM .....	16
Figure 8: System conceptualisation developed by Soc Trang stakeholders .....	20
Figure 9: Direct and indirect flow-on effects resulting from rainfall .....	21
Figure 10: Direct and indirect flow-on effects resulting from flooding .....	21
Figure 11: Direct and indirect flow-on effects resulting from reduced harvest productivity .....	21
Figure 12: Direct and indirect flow-on effects resulting from reduced aquaculture productivity .....	22
Figure 13: Direct and indirect flow-on effects resulting from sea level rise.....	22
Figure 14: Direct and indirect flow-on effects resulting from storm surge .....	22
Figure 15: Direct and indirect flow-on effects resulting from population growth .....	23
Figure 16: Direct and indirect flow-on effects resulting from urbanisation .....	23
Figure 17: Direct and indirect causes of flooding .....	23
Figure 18: Direct and indirect causes of reduced harvest productivity .....	24
Figure 19: Direct and indirect causes of reduced aquaculture productivity .....	24
Figure 20: Direct and indirect causes of human health impacts .....	24
Figure 21: Direct and indirect causes of food security .....	25
Figure 22: Direct and indirect causes of economic growth .....	25
Figure 23: Direct and indirect causes of poverty .....	26
Figure 24: Relationships between variables in terms of influence and dependence .....	27
Figure 25: Feedback loop relating to poverty, crime and loss of jobs .....	29

Figure 26: Feedback loops relating to economic growth, education and increased jobs .....	29
Figure 27: Participant leadership in declaring plausible futures .....	34
Figure 28: Determining priorities for action .....	35
Figure 29: Collecting the visions .....	39
Figure 30: Perceived importance of various capitals to achieve ICAM in Soc Trang .....	41
Figure 31: Perceived internal capacity to achieve ICAM in Soc Trang .....	41
Figure 32: Perceived provincial capacity to achieve ICAM in Soc Trang .....	42
Figure 33: Integration of various perceptions of capacity to achieve ICAM in Soc Trang .....	42

## 1. Introduction

The resilience of coastal socio-ecological systems is increasingly tested through the impacts of climate change and patterns of development associated with rapid population growth and economic development. Recognition that mitigation efforts alone will be insufficient to ensure community resilience has prompted an increased focus on the facilitation of adaptive responses to the dynamics experienced within coastal systems. Integrated Coastal Area Management (ICAM) is an established approach for building community response capacity in coastal zones. It builds on context-specific knowledge generated through adaptive learning and action. This report contributes to improving ICAM in Soc Trang province, Vietnam, by using a combination of systems thinking and futures studies tools to develop a comprehensive understanding of the current contexts for coastal management in this region, including the identification of preferred futures/goals of various sectors and communities and the priority actions needed to achieve these.

## 2. Aim and objectives

The aim of the study was to support the development of a concept for a legal and institutional framework for Integrated Coastal Management in Soc Trang Province.

Specific objectives of the project included:

- Establishment of an Interdisciplinary Planning Team with members of different sectors in Soc Trang province;
- Undertake a desktop review of coastal management issues for Soc Trang province;
- Develop a system diagram that reflects stakeholder perceptions of coastal management issues for Soc Trang province;
- Identify preferred and sustainable futures for coastal management activities in the Soc Trang province; and
- Undertake and analyse key informant interviews for improved coastal management in Soc Trang province.

This report will focus on the system conceptualisation and futures workshop, and the key informant interviews.

## 3. Methods

The study consisted of five key stages (Figure 1):

- Desktop review of coastal management issues to inform the system conceptualisation and futures workshop;
- Design and conduct of system conceptualisation to identify perceptions of the key coastal management issues (including drivers of change and impacts);
- Design and conduct of futures workshop to identify possible future pathways;
- Analysis of adaptive capacity using a capitals framework; and
- Production of a final report.

The methods were based on those used in several other studies focused on ICAM and climate change adaptation (see for example Smith *et al.*, 2007; Gidley *et al.*, 2010; Smith *et al.*, 2010; Measham *et al.*, 2011; Smith *et al.*, 2011a; Smith *et al.*, 2011b; Roiko *et al.*, 2012; Bussey *et al.*, 2012; Richards *et al.*, 2012; and Keys *et al.*, in press).

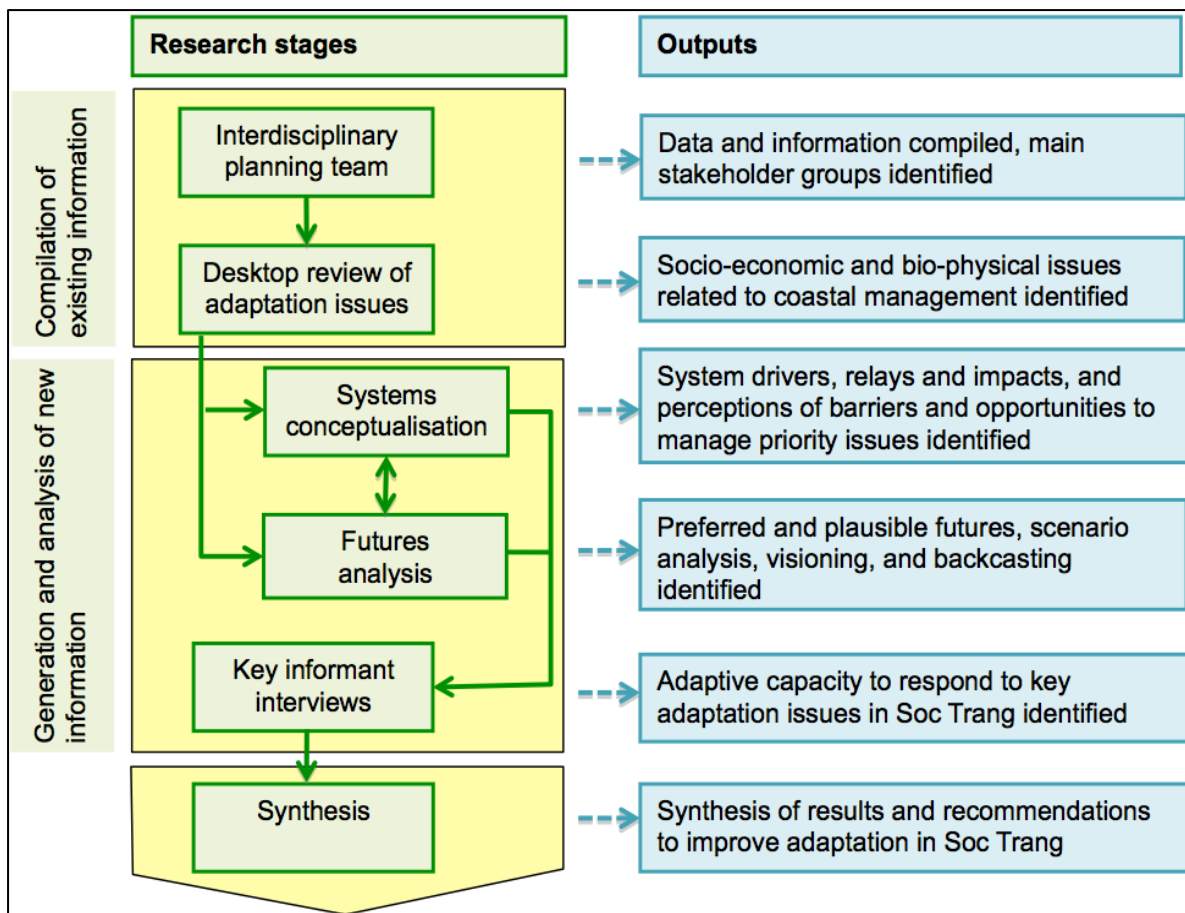


Figure 1: ICAM project stages and outputs

### 3.1 Desktop review

A desktop review was undertaken to analyse the issues relevant to ICAM for Soc Trang and provide contextual information to stimulate discussion during the systems and futures workshop.

- Sourcing of coastal management literature relevant to Soc Trang (information provided by GIZ plus a scan of academic and scientific literature); and
- Synthesis of coastal management issues;

Literature was provided by GIZ and complemented with an additional scan of relevant academic and scientific literature. An overview of the keys points from the review is provided in this report (please refer to section on “Soc Trang contextual analysis”).

### 3.2 Systems and futures workshop

Complexity, uncertainty and high decision stakes categorise coastal management in the face of climate change (Smith, 2009). Systems and futures approaches provide useful tools for:

- Unpacking complexity;
- Identifying plausible futures; and
- Developing strategies to address the key concerns of sectors and communities over multiple time scales.

A combined systems and futures workshop was used to explore ICAM issues for Soc Trang through:

- Development of a conceptual system model;
- Identification of current priority issues;
- Identification of perceived capacity to manage priority issues;
- Identification of preferred coastal management futures under a range of biophysical and socioeconomic scenarios;
- Identification of constraints to the achievement of preferred futures.

The workshop was held over 2 days (4 and 5 July 2012) in Soc Trang. The workshop consisted of both plenary discussions and smaller breakout group discussions and was broken into two components—systems conceptualisation and futuring exercises. The workshop comprised a cross-section of ICAM stakeholder interests, including government agencies, NGOs, district representatives, and industry representatives (e.g. aquaculture and agriculture).

### **3.2.1 System Conceptualisation**

#### ***Rationale for undertaking a system conceptualisation exercise***

One of the underpinning concepts of ICAM is that various issues are interdependent. As such, the issues that have adverse effects on sustainability often have multiple flow-on effects and these may be further exaggerated or dampened by other factors. Systems conceptualisation is a way of expressing and understanding the interdependencies relevant to complex sustainability issues. Systems conceptualisation allows the identification of the root causes affecting sustainability (drivers), the factors that may exaggerate or dampen the effects on sustainability (relays), and the effects themselves (impacts). By using a systems approach, communities are better placed to understand the likely consequences of their actions on sustainability (and their flow-on effects) and to make informed judgements about when and where to make key interventions that will have the most positive and far-reaching implications upon sustainability. Systems thinking approaches are increasingly being used in sustainability studies, including another recent study in Cat Ba Biosphere Reserve in northern Vietnam (Nguyen *et al.*, 2011).

#### ***Stimulus for the systems conceptualisation exercise***

To stimulate the co-development of a systems diagram among various Soc Trang stakeholders, two main forms of pre-systems conceptualisation stimulation were used. The first included a presentation on some of the key issues affecting Soc Trang (i.e. the information presented in the Soc Trang contextual overview section of this report). The second consisted of an interactive session based on a series of maps, supplied by GIZ, that were pasted along the walls of the venue and included information on changes in land-use over time, current and planned infrastructure, and changes to the shoreline (Appendix 1). While there was some discussion over the accuracy of the maps, the approach allowed workshop participants to observe and discuss some of the key drivers of change for the province.

#### ***Development of a Systems Diagram***

Stakeholders were guided through a facilitated discussion that led to the development of a shared mental model (systems diagram) for Soc Trang. As a first step in the process the key drivers of change were captured, followed by the identification of perceived impacts resulting from the drivers. Issues and linkages were captured simultaneously in English and Vietnamese.

#### ***Digital capture and analysis of a Systems Diagram***

Using the software package Vensim (developed by MIT in the USA) a graphical depiction of the system of interactions between various ICAM drivers, relays and impacts was captured. There are

several other systems conceptualisation software packages (e.g. Stella) that could have also been used for this purpose. Vensim and other systems conceptualisation tools have been used in applications such as business and computer sciences but their utility for better understanding sustainability issues is becoming increasingly apparent. Vensim is a powerful software package that has many complex functions. For the workshop in Soc Trang, Vensim was used to develop a conceptual diagram in order to engage workshop participants in systems thinking and to identify perceived key issues for each of the sectors represented.

### ***Identification of priority issues***

Once the systems diagram was created and translated into Vietnamese (over the lunch break) participants were able to interrogate the linkages between perceived key issues. Stakeholders self-selected their participation in pre-categorised sector groupings (i.e. agriculture and rural development; aquaculture; planning/coordination and environment; districts; and “other”—including the military, the Women’s Union, and other organisations). Each sector group identified the priority issue for their sector.

#### Perceptions of capacity

Sector groups discussed their priority issue in relation to:

- Their current capacity to manage the priority issue;
- Barriers to managing the priority issue; and
- Opportunities for managing the priority issue. Discussion was captured by the groups and presented back to the collective of workshop participants. The perceptions of barriers and opportunities were used to inform (along with the results of the futures exercise) subsequent key informant interviews that explored capacity issues in more detail using a capitals framework (e.g. Bourdieu 1986; Bebbington 1999; Emery and Flora 2006; Nelson et al. 2010a and Nelson et al. 2010b).

## **3.2.2 Futures Studies concepts and methods**

### ***Rationale for undertaking a study of the future***

The purpose of undertaking a study of the future can be varied. A study of the future is a study *of the ideas and images* held about the future in a selected context. The use of futures concepts and methods can greatly assist in understanding the many *forces of change, competing images and barriers to change* (Inayatullah 2007). Forces of change tend to be historically created and continue to influence present and future imaginings. Hence, one of the main purposes of a study of the future is to disrupt these forces of change and explore how dominant ways of knowing can bind or blind with regard to imagining other types of futures. Therefore, a futures study can enable individuals and societies to question, critique and consider how to create options for the future.

A study of the future is also a study of the possible, probable, plausible and preferred futures— there is more than simply one future—there are many types of futures that can be investigated (Inayatullah 2007). The tools of futures studies seek to facilitate the co-development of alternative futures and the identification of desired or preferred future images and ideas.

For example, a study of the future may focus on an analysis of societal structures (ways in which societies order and shape their realities) to highlight the limitations and consequences of a future anticipated. The creation of alternative and desired futures may require societies rethink resource allocation and usage across their society. As such, a futures study is a means to view, create, and prioritise the implementation of preferred futures. The ability to enact the preferred futures is a matter of human agency, politics and capacity.

The purpose of a futures studies workshop is to investigate how ideas and images influence the present, especially in terms of strategy, planning and decision/ policy making (Milojevic 2011). A

futures studies workshop is a continuation of a 'series of investigations into the various possibilities (plausible in terms of present-day knowledge and theory) and investigations of cause and effect dynamics, extrapolation of current trajectories towards their logical consequences' (Milojevic 2011).

In this project, the aim of a futures study was to find the many existing and competing images, preferred scenarios and visions and actions, to create a preferred future for ICAM for Soc Trang by 2025. To achieve these outcomes, a *futures study workshop* using on an Anticipatory Action Learning approach was developed by Mr Steve Gould.

### **Theoretical background to futures workshop design**

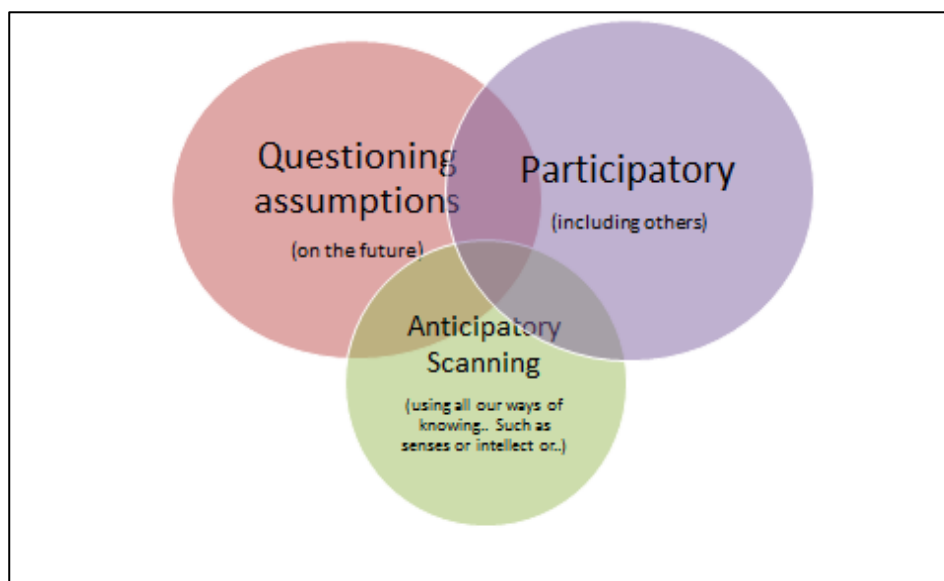
The design of futures workshops needs to be cognisant of local contexts and desired outcomes. There are several futures approaches that can be selected from to best meet the needs of workshop participants (Inayatullah 2007, p. 198):

- Empirical futures;
- Interpretative futures;
- Critical futures; and
- Anticipatory Action Learning futures.

Based on the outcomes desired from the Soc Trang ICAM workshop, an Anticipatory Action Learning approach (AAL) was selected. An AAL approach is participatory; utilises theories and methods that support inclusion; and provides more agency to stakeholders in designing workshop processes, collaborating, and sharing lessons. Thus, AAL can build social and human capital and provide a foundation for on-going collaborative networks towards an alternative ICAM 2025.

These features also allow an AAL approach to work with the 'epistemological framework of the participant', rely less on expert forecasts, and more on participant knowledge (historical and contemporary) to determine the future (Inayatullah 2006, p. 657). The diversity of the Soc Trang ICAM workshop stakeholder profile enabled a detailed consideration of issues across a range of contexts and perspectives—creating spaces for participants to compare, contrast and critique a range of assumptions and viewpoints. The identification and then questioning of assumptions and alternative futures, develops the capacity of participants to challenge the future—rather than to consider the future a default position.

Figure 2 summarises the core features (participation, anticipation, and questioning) that constitute an AAL approach.



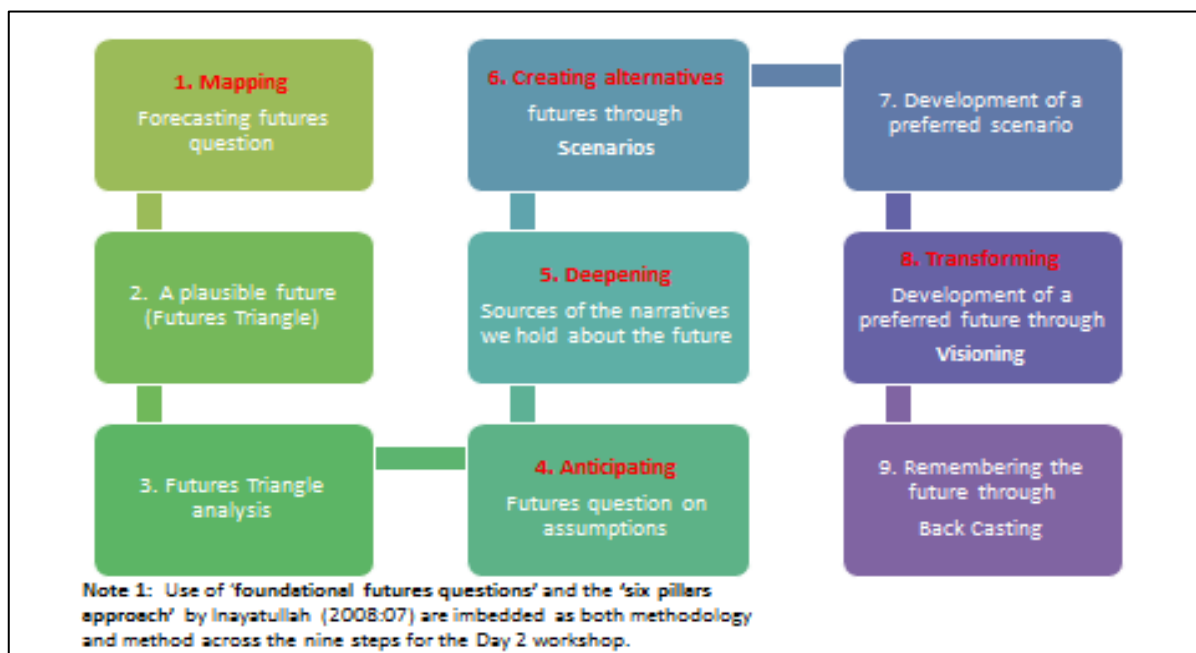
**Figure 2: Anticipatory Action Learning Approach (Inayatullah, 2007)**

## **Futures methodology**

The conduct of the futures workshops used the **six pillars** methodology (Inayatullah 2007) to transition the perspectives of participants from predicting the future through anticipating the future to co-creating preferred futures. The six futures pillars and associated methods are:

- Mapping (identifying the weights, pulls and pushes of trends over time);
- Anticipating (emerging issues and trends);
- Timing (understanding temporal patterns of change);
- Deepening (understanding the layers of reality, both present and future);
- Creating alternatives (scenarios); and
- Transforming (visions and action learning experimentation).

Figure 3 illustrates how each of the six pillars was applied to the workshop process.



**Figure 3: Futures process**

## **Futures methods**

The rationale and associated methods for each of the six futures pillars is described in the following.

### **Pillar No 1: Mapping the future**

The purpose of mapping is to begin the process of understanding the future. Mapping assists to outline the landscape of change forces (drivers), barriers (resistance) to change, and dominant or recessive images (ideas) held about the future. The workshops in this project used the **Futures Triangle** methods to map the future. The futures triangle maps the three dimensions: The **push** of the future (drivers of change), the **pull** of the future (the official image for the future), and the **weight** of the past or future (barriers to change) (Figure 4). The futures triangle assists with situating the results from the environmental scanning or systems thinking results into a method for analysis so that the competing dimensions shaping the future can be recognised and investigated.



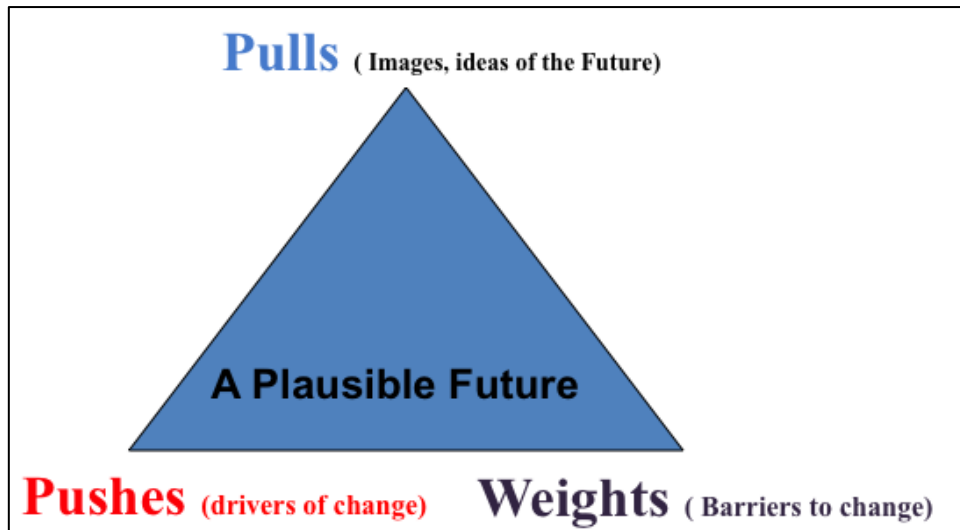


Figure 4: The Futures Triangle (Inayatullah, 2008, p. 23)

**The Pillar of Creating Alternatives**

The creation of alternative ideas about the future, beyond default or dominant positions, can be done through the use of **scenarios**. Scenarios need to consider uncertainty, complexity and risk towards futures that are both preferred and sustainable. Desirable scenarios can then be used to develop appropriate visions, strategies and actions. In the ICAM Soc Trang Workshop, the results from mapping the future and the environmental scan, informed the selection of the two scenario methods utilised—the Archetypal (collapse/preferred scenario) and the Integrated (a hybrid approach combining selected elements from each group’s preferred scenarios). The results from the futures triangle were then used to provide the plausible scenario (Figure 5).

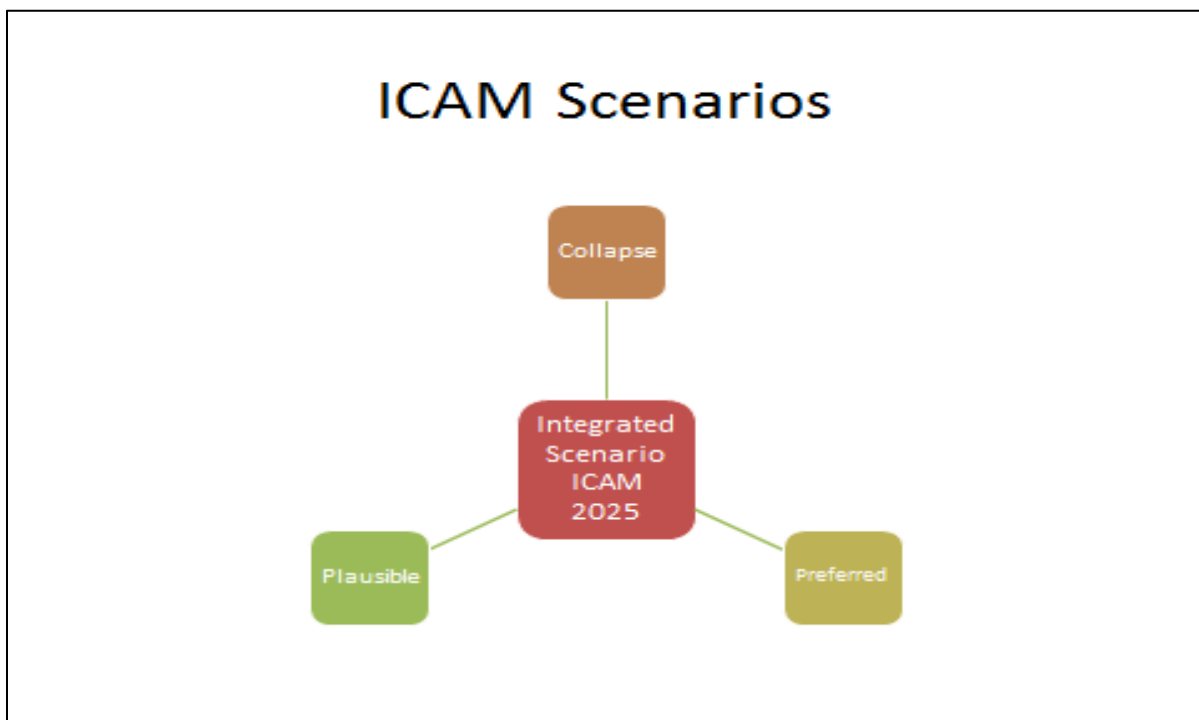


Figure 5: Possible scenario for ICAM in Soc Trang

### **The Pillar of Transformation**

The last pillar of futures studies is the pillar of transformation and is designed to establish preferred futures. Within the ICAM Soc Trang Workshop, the methods of creative visualisation and backcasting were selected to access more intuitive understandings and to develop imaginative and innovative responses. In the development of creative visualisation, the facilitator guided participants through a nine-step process that enabled participants to record their preferred visions for the future. Through back casting, the future imagined is considered as being accomplished and participants are invited to reflect on the key decisions and events that occurred on the pathway to achieving the vision. According to Inayatullah (2007, p. 225), the goal of back casting is to increase levels of agency (i.e. among Soc Trang stakeholders) and effectiveness (i.e. through ICAM) to accomplish the desired future. As such, a vision can be broken down into a series of transformative events, decisions, outcomes, and relationships that map from the future back to the present.

### **Foundational futures questions**

At each stage in the futures process (Figure 3), foundational futures questions (Inayatullah 2008) were used to assist participants in questioning the future (the assumed or official future). Applying the foundational futures questions begins with the identification of forecasted futures before engaging with the questioning process (Figure 6). The questioning process challenges assumptions and identifies preferred futures and the necessary enabling conditions.

1. What will the future be like for...? (What is your prediction or forecast?)
2. What future do we fear/wish to avoid or are afraid of from our predicted future?
3. What are the hidden assumptions of our predicted future?
4. What alternatives are there to that which is predicted?
5. What are our preferred futures? (Which future do you wish to become a reality?)
6. How do we reach our preferred futures? (What steps can you take to move towards your preferred?)

**Figure 6: Foundational Futures Questions** (Inayatullah, 2008, p. 7)

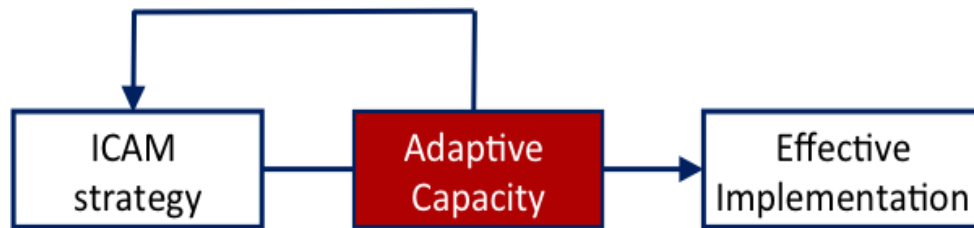
### **3.3 Adaptive capacity assessment**

The success or failure of ICAM strategies depends on a number of factors. Of central concern is the notion of capacity to implement and respond to ICAM issues (Figure 7). Similarly, in the area of climate change, adaptive capacity has become recognised as a key consideration for effective adaptation. While there are numerous definitions of adaptive capacity, for the purposes of this report, the IPCC Fourth Assessment Report definition of adaptive capacity (Adger *et al.*, 2007) is used as starting point:

Adaptive capacity is the ability of a system to evolve in order to accommodate climate changes or to expand the range of variability with which it can cope (Jones, 2001; Yohe and Tol, 2002).

Alternative definitions are similar in character but with nuances relating, for example, to “A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster” (UN/ISDR, 2004) and “... the set of resources available for adaptation, as well as the ability or capacity of that system to use these resources effectively in the pursuit of adaptation” (Lim *et al.*, 2005). In addition, Lim *et al.* (2005) and

many other authors highlight that adaptive capacity also relates to system adjustments to existing climate variability and/or future climate conditions.



**Figure 7: Adaptive capacity enabling or constraining implementation of ICAM**

Key informant interviews were conducted to provide a rapid assessment of adaptive capacity in Soc Trang province. The interviews identified priority issues and capacity constraints for improved coastal management in the province. The perceptions of barriers and opportunities from the systems and futures workshop were used to inform the focus of key informant interviews, which also utilised a capitals framework. While there are numerous interpretations of the types of capitals relevant to adaptive capacity (e.g. Bourdieu 1986; Bebbington 1999; Emery and Flora 2006; Nelson et al. 2010a and Nelson et al. 2010b), for the purposes of this project, a 6-capitals framework has been adopted that includes the following:

- **Human capital:** e.g. skills, knowledge and experience of people;
- **Social capital:** e.g. the functional relationships that exist between people;
- **Financial capital:** e.g. the financial resources that can be utilised for ICAM;
- **Built capital:** e.g. infrastructure and other built assets;
- **Organisational capital:** e.g. the organisational attributes needed for ICAM; and
- **Natural capital:** e.g. the extent and condition of natural assets.

Ten key informant interviews were conducted with representatives of key stakeholder groups in Soc Trang over a 3-day period (2 to 4 July 2012) and each interview lasted from between 30 and 60 minutes. The key informants were selected in consultation with GIZ and other partners in order to provide a cross-section of ICAM perspectives (e.g. various district representatives and government agency senior staff). Each interview was conducted with a translator and audio recorded. The interviews were semi-structured with a combination of closed and open-ended questions (Appendix 2). The interviews were analysed qualitatively for emerging themes and also analysed quantitatively for ratings of each of the 6 capitals. The 6 capitals were rated in terms of:

- The importance for coastal management in Soc Trang;
- The extent of each capital within their organisation or sphere of influence; and
- The extent of each capital within Soc Trang province.

#### 4. Soc Trang contextual analysis

Soc Trang is located in the Mekong delta and is dominated by agricultural land-uses (Soc Trang Statistics Office, 2011) (Table 1). The population in the province is continuing to increase, although the rate of increase has slowed over recent years—from 2005 to 2010 the population of Soc Trang province increased by 42,252 people (3.36% increase over 5 years). However, Soc Trang is rapidly urbanising with a 50% increase in urban dwellers between 1992 and 2010, and over 29% of the population of the province now resides in urban areas. This trend in urbanisation has led to an increase in urban-based economic activity and associated infrastructure. For example, manufacturing, trades and construction now account for over 20% of the workforce and other urban-based sectors are also on the rise such as financial and scientific sectors. The relative contribution of various sectors to Gross Regional Product (GRP) is also changing—the agricultural sector continues to dominate GRP but with a reduced relative contribution (Soc Trang Statistics Office, 2011) (Table 2).

**Table 1: Summary of Soc Trang characteristics**

<b>Area</b>	331,118 ha
<b>Population</b>	1.3 million
<b>Population density</b>	393 people per square km
<b>Agricultural land use</b>	84%
Paddy land	44%
Fishing / agriculture	16%
<b>Gross regional product per person</b>	20.4 million VND (USD 1,066)

**Table 2: Contributions to GRP (in VND) of various sectors in Soc Trang from 1992 to 2010**

Year	Agriculture, forestry and fishing	Industry and construction	Services	Total
<b>1992</b>	1,699,051 (65%)	459,456 (18%)	453,752 (17%)	2,612,259
<b>2010</b>	29,038,814 (52%)	15,332,862 (27%)	11,848,499 (21%)	56,220,175

Apart from dynamism associated with socio-economic change, Soc Trang is also experiencing dynamism in relation to bio-physical change. Climate change is a key driver of change that will persist for at least the next century even if current emission levels are mitigated. Some of the climate change exposure changes projected for Soc Trang include:

- **Sea level rise:** Projected increases in sea level rise range from 28 to 58 cm by 2100 (Chaudhry and Ruyschaert, 2007). Nicholls *et al.* (2007) highlight that the Mekong Delta is extremely vulnerable to sea-level rise.
- **Increased temperatures:** Projected increases in temperature range from 2.5 to 2.8°C by 2100 (Chaudhry and Ruyschaert, 2007), which may affect crop yields and also human

health (e.g. potential for increases in the incidence of vector-borne disease such as malaria and dengue).

- **Wetter and more extreme events:** Projected increase in daily rainfall range from 12 to 19% by 2070 (MoNRE, 2003), which will increase the likelihood of extreme flood events. Even without considering future climate change impacts, the Mekong Delta is highly susceptible to flooding, with 75% of Vietnam's areas at risk located in the Mekong (e.g. the devastating floods of 2000 and 2001 resulted in 481 and 393 fatalities respectively) (Chaudhry and Ruyschaert, 2007). However, while there will be periods of more intense rainfall, there will also be periods of more prolonged drought (Parry *et al.*, 2007).

From 1991 to 2000 more than 8,000 people were killed by natural disasters in Vietnam (Chaudhry and Ruyschaert, 2007). They also state that the rural poor will be most affected by climate change due to their reliance on agriculture, aquaculture and fisheries for their income and food security. For example, sea level rise and storm surge is likely to adversely impact on agricultural production in the Mekong (e.g. through salt water intrusion). In addition, in the 2006 ICZM (ICAM) strategy for Vietnam developed by MoNRE, it was identified that there is current over-exploitation of wild fish stocks, which may be exacerbated by climate change through altered fish species abundance and distribution.

Dasgupta *et al.* (2007) state that a 1-metre rise in sea level would affect 5% of the land area of Vietnam, 11% of the population, and reduce Gross Domestic Product by 10%. In order to reduce the impacts of sea level rise and storm surge a number of initiatives have been put in place such as dyke construction. In addition, there has been a focus on mangrove rehabilitation and restoration as a key mechanism to reduce climate change impacts in coastal areas (see for example Powell *et al.*, 2011).

While there is increasing financial wealth on average in the province (GRP has increased from 2.6 million VND per person in 1995 to 20.4 million VND per person in 2010), this may not necessarily translate into the broad-scale resources needed for climate change response. For example, Adger (2002) observed that climate change response in the Red River Delta was restricted by the concentration of wealth and capital among a small proportion of the population.

In April 2012, the Vietnamese government approved a "Master Plan on Socio-economic Development of Soc Trang Province through 2020" (Vietnamese Government, 2012). The master plan includes statements relating to economic development, social progress and justice, human resource development, and to be proactive in preventing the impacts of climate change (with specific reference made to sea level rise). The master plan includes the following development objectives:

- Development of sustainable hi-tech agriculture (in conjunction with industrial and service development);
- Development of the provincial infrastructure system;
- Improvement in the material and spiritual wealth of communities; and
- Consolidated defence-security measures to assure social order.

More specific development objectives include a reduced reliance on agriculture towards a growth specifically in the services sectors (Table 3). However, the Master Plan also refers to the intensification and growth of the agriculture, forestry and fishing sectors. For example, developing speciality rice, vegetables and aquaculture products, increasing growth in the outputs for the sectors by 4.2% per annum (however, the desired growth in the services sectors is up to 16% per annum). In terms of aquaculture in particular, there is reference to the expansion of farms in saline, brackish and freshwater areas; to improve infrastructure to support aquaculture; to apply biotechnology and advanced technical processes; and to expand the total area under aquaculture to 80,000 ha (including 49,000 ha for shrimp) by 2015 and up to 85,000 ha by 2020. Similarly, the Master Plan also includes the expansion of the output and efficiency of the offshore fishing fleet, including the construction of fish ports. Marine and cultural tourism is also proposed to "make tourism a spearhead industry in international economic integration".

**Table 3: Projected changes to the contributions to GRP of various sectors in Soc Trang from current levels (2010) to 2015 and 2030**

<b>Year</b>	<b>Agriculture, forestry and fishing</b>	<b>Industry and construction</b>	<b>Services</b>	<b>Average income per capita</b>
<b>2010</b>	52%	27%	21%	USD 1,066
<b>2015</b>	40%	25%	35%	USD 1,800
<b>2030</b>	28%	34%	38%	USD 3,300

The Master Plan includes a number of other objectives relating to reduction of poverty levels, improved levels of education, and improved health. Other objectives relate to environmental goals such as increasing forest coverage (mainly for timber production) for the province and increasing collection and treatment of solid and industrial waste. The Master Plan also includes specific reference to integrated management of the coastal zone. In addition, there is a recognition of the need to respond to climate change and sea level rise. However, apart from mentioning re-settlement plans, there is a strong emphasis on protection strategies with several prioritised projects for the province relating to the upgrading or construction of sea dykes (4 major dyke projects identified).

## 5. Results

### 5.1 Systems model

A participatory systems diagram was developed by Soc Trang stakeholders (Figure 8). The systems diagram represents a shared mental model of the variables (38) related to ICAM and connections (78) between them.

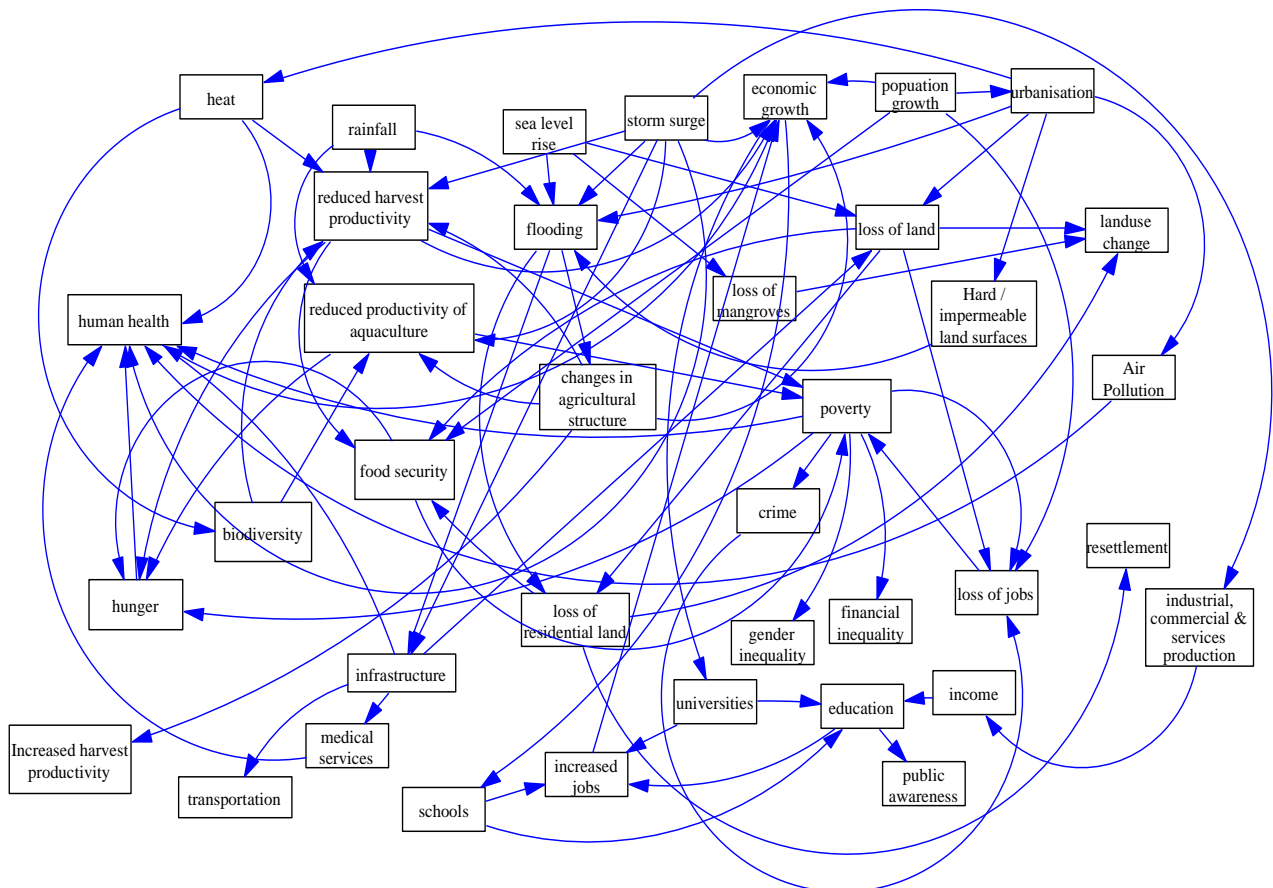
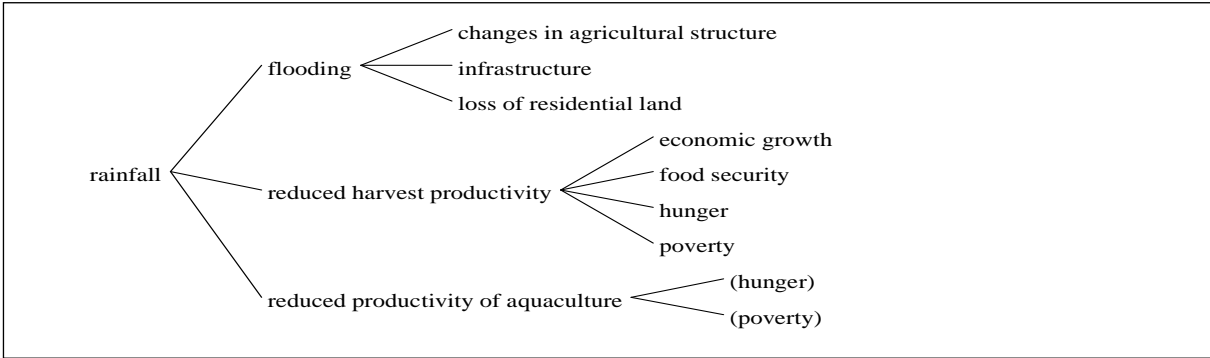


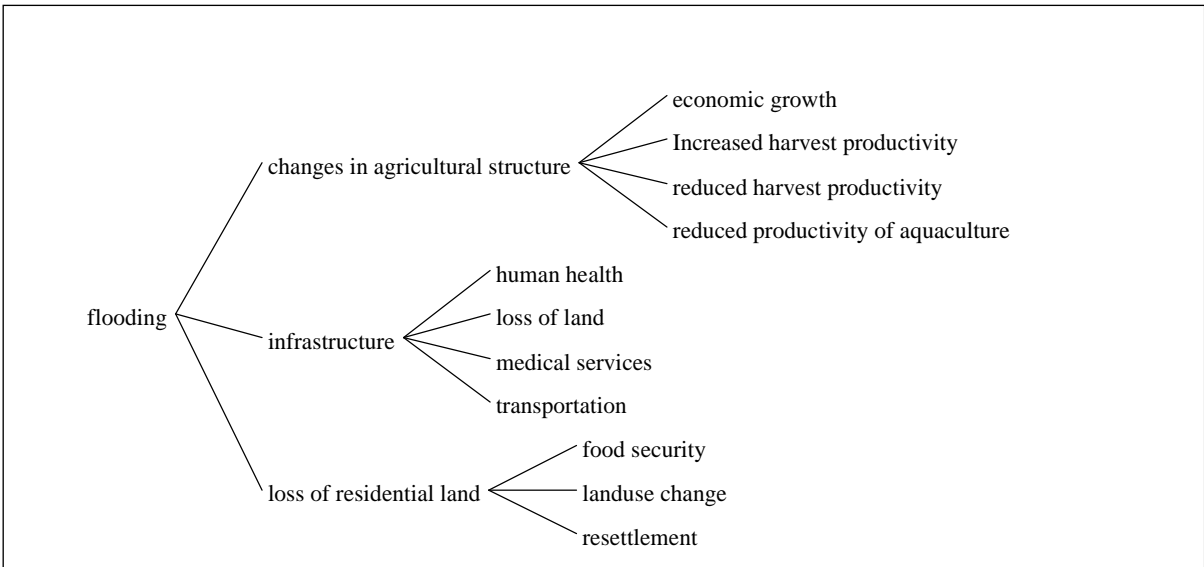
Figure 8: System conceptualisation developed by Soc Trang stakeholders

#### 5.1.1 Examples of direct and indirect flow-on effects of ICAM issues

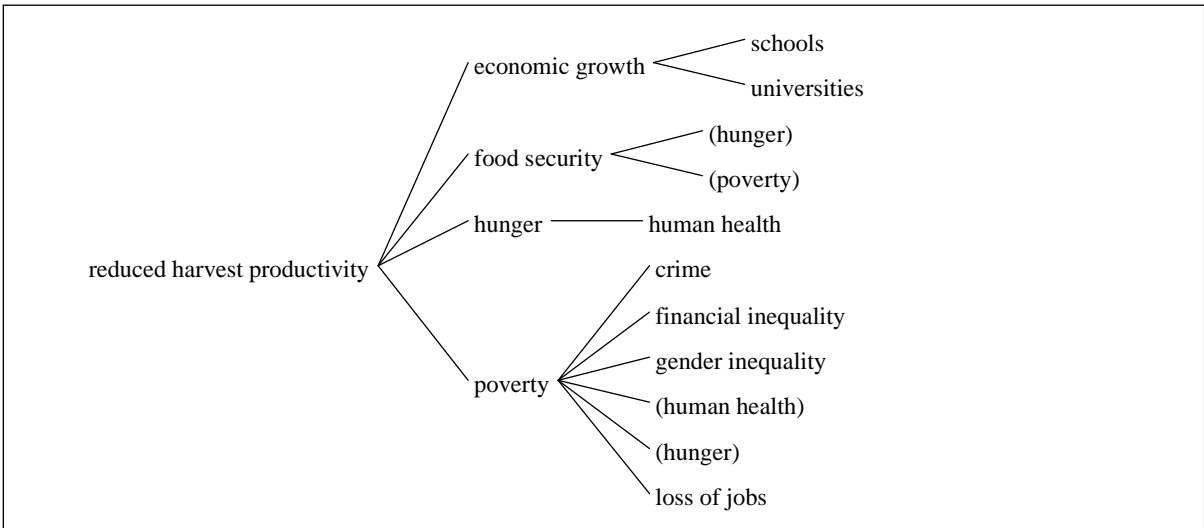
The systems diagram was interrogated to highlight numerous direct and indirect flow-on effects resulting from a change in the system variables (Figures 9 to 16 – note: that variables in brackets were impacted upon through multiple pathways).



**Figure 9: Direct and indirect flow-on effects resulting from rainfall**

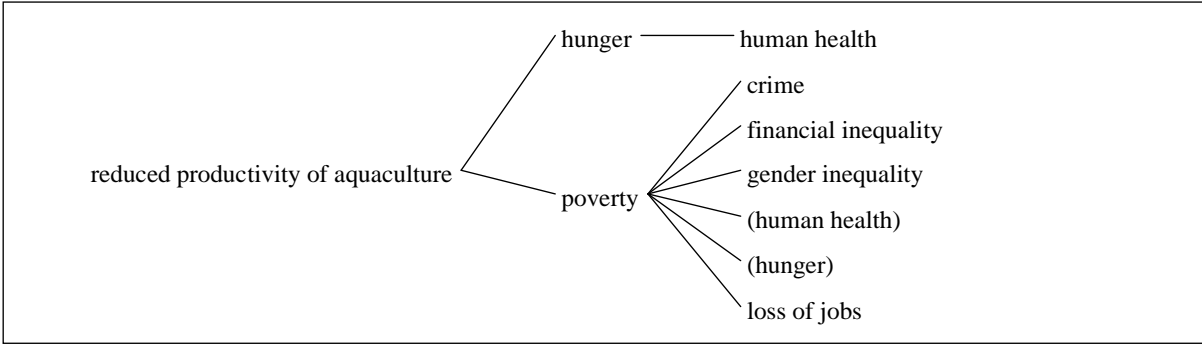


**Figure 10: Direct and indirect flow-on effects resulting from flooding**

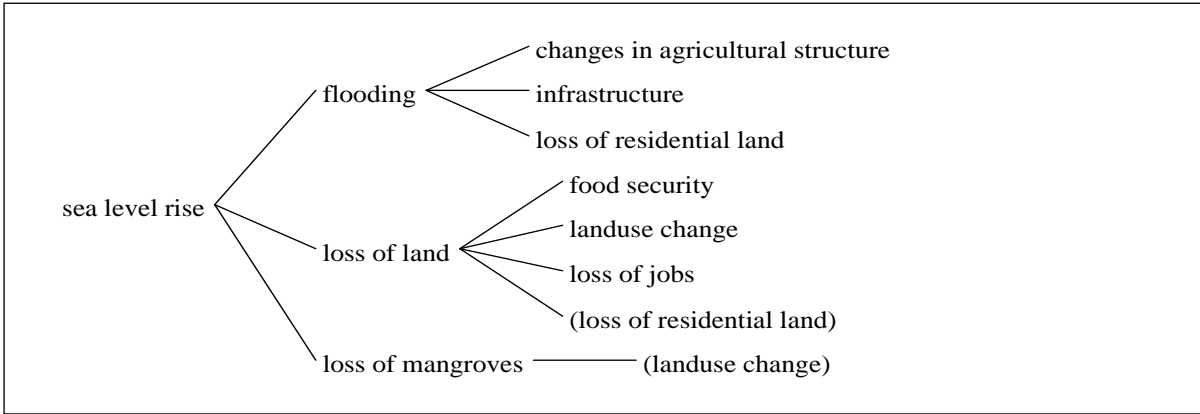


**Figure 11: Direct and indirect flow-on effects resulting from reduced harvest productivity**

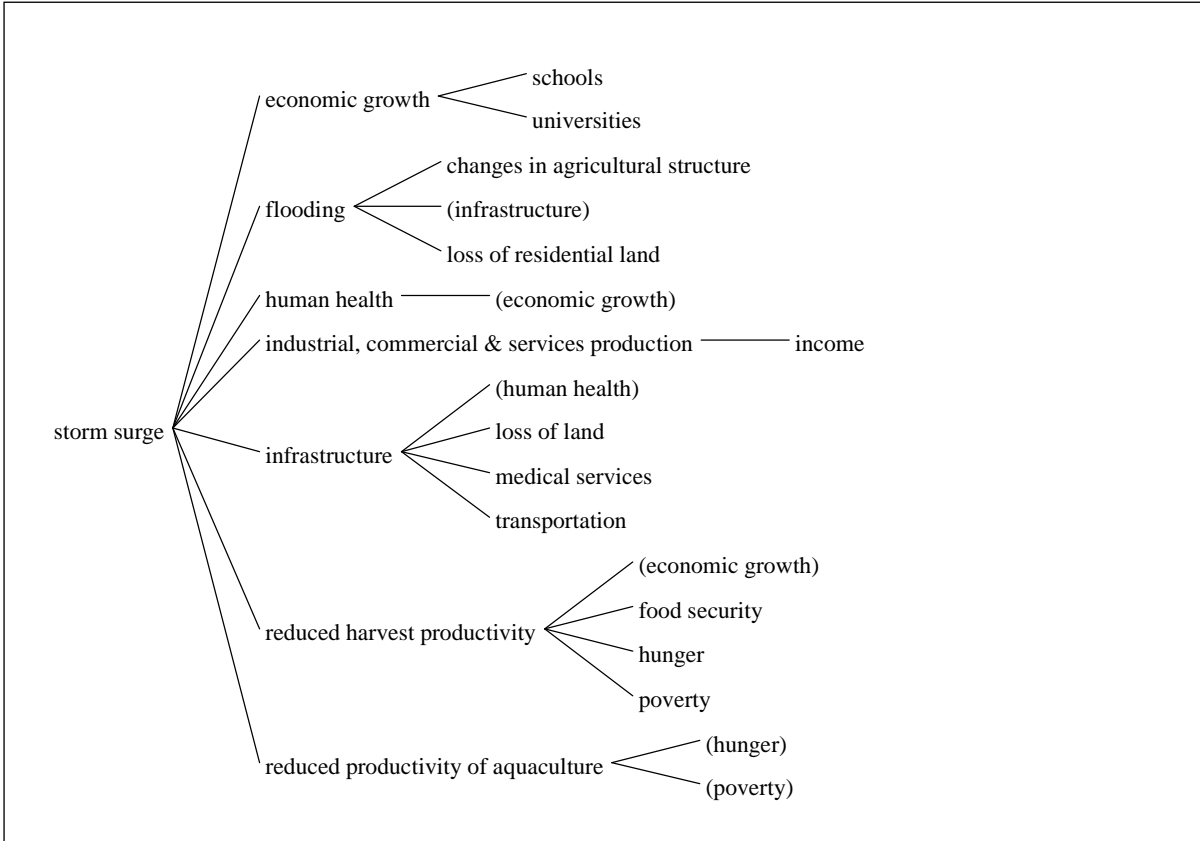




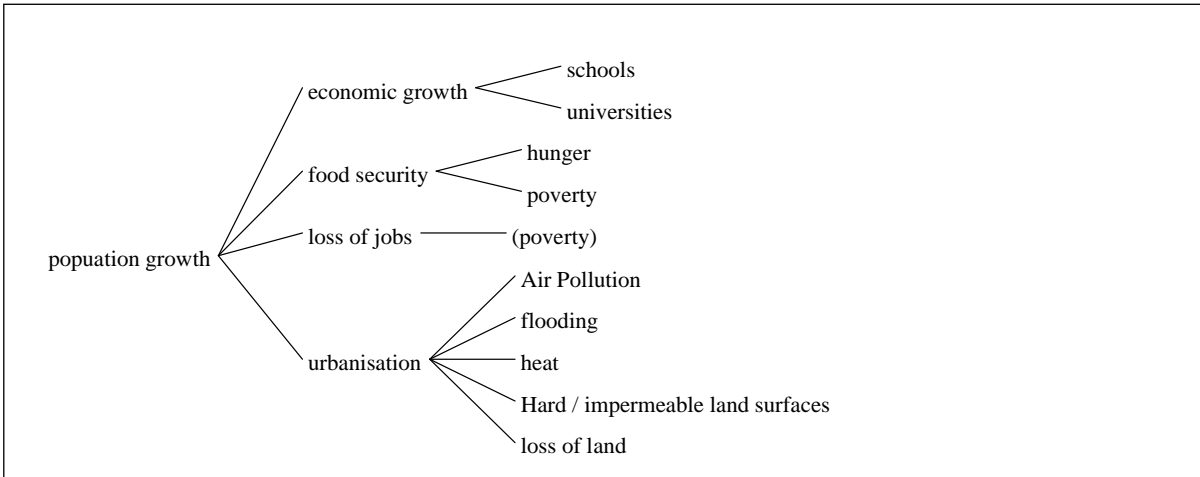
**Figure 12: Direct and indirect flow-on effects resulting from reduced aquaculture productivity**



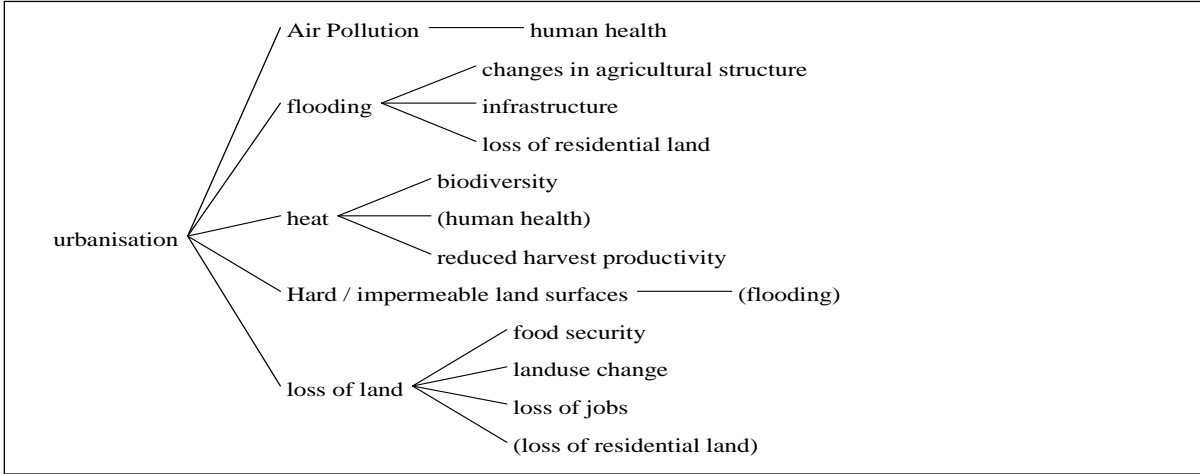
**Figure 13: Direct and indirect flow-on effects resulting from sea level rise**



**Figure 14: Direct and indirect flow-on effects resulting from storm surge**



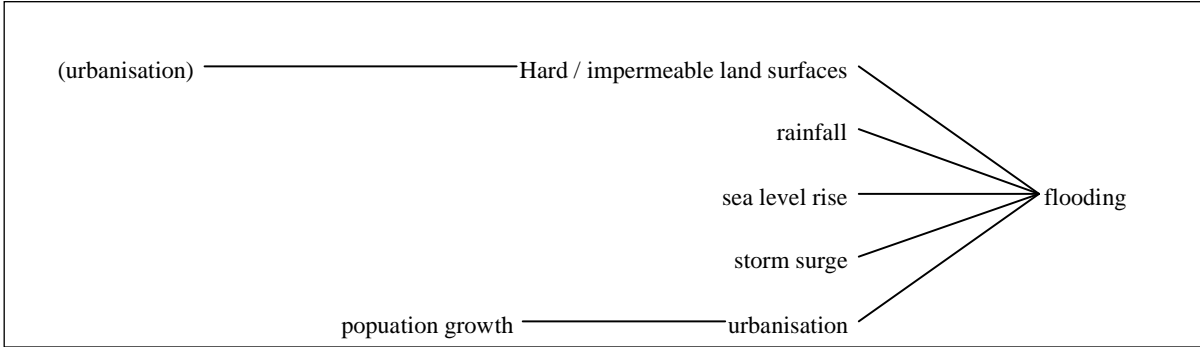
**Figure 15: Direct and indirect flow-on effects resulting from population growth**



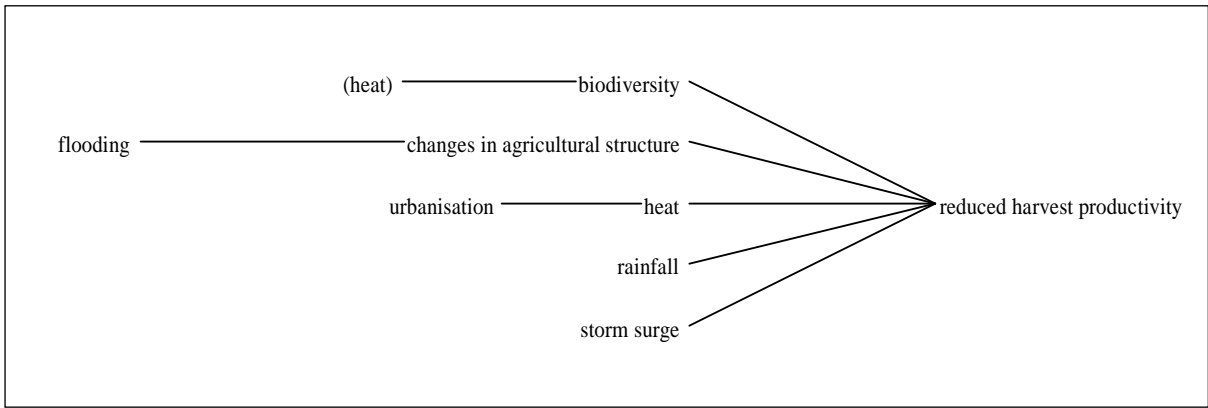
**Figure 16: Direct and indirect flow-on effects resulting from urbanisation**

**5.1.2 Examples of direct and indirect causes of ICAM issues**

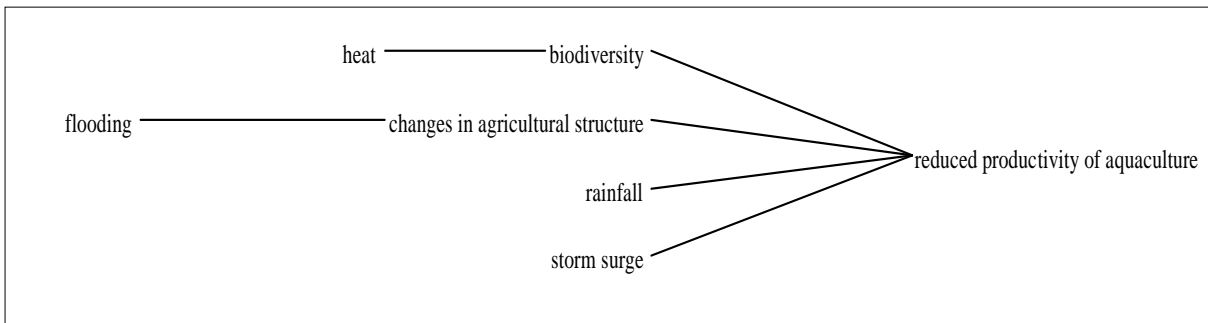
The systems diagram was also interrogated to highlight numerous direct and indirect causes of change in the system variables (Figures 17 to 23 – note: that variables in brackets caused impacts through multiple pathways).



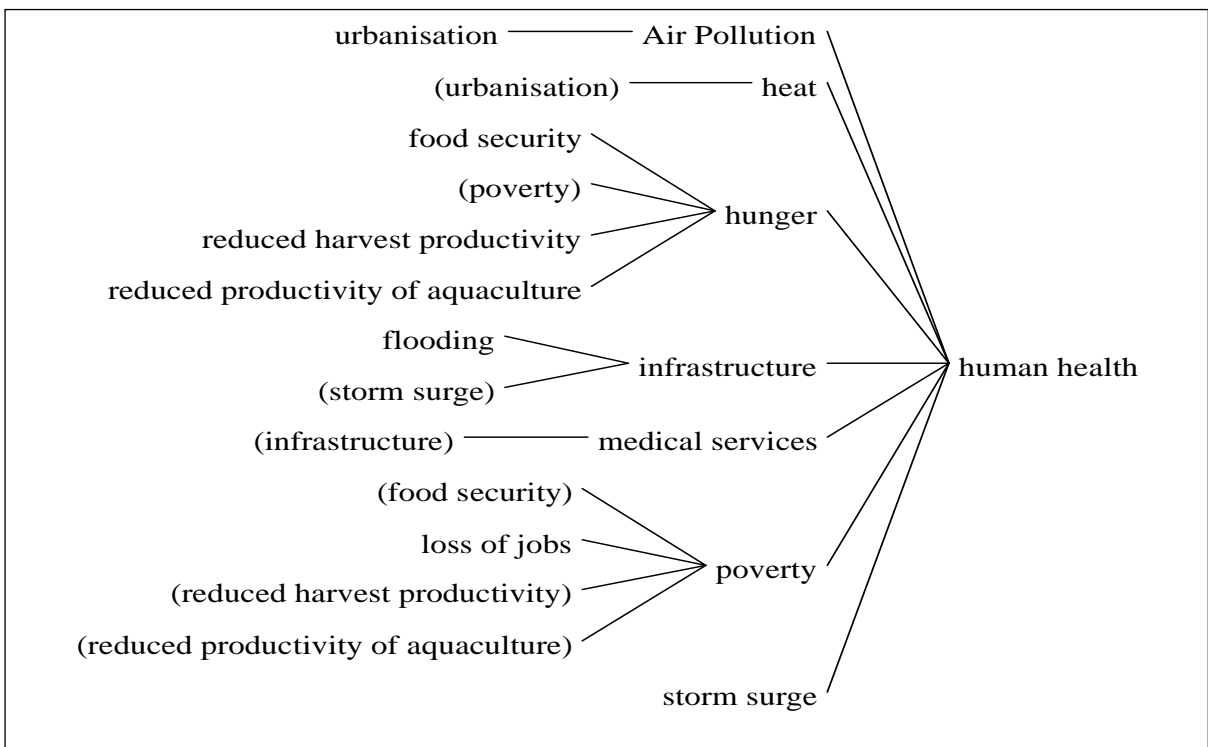
**Figure 17: Direct and indirect causes of flooding**



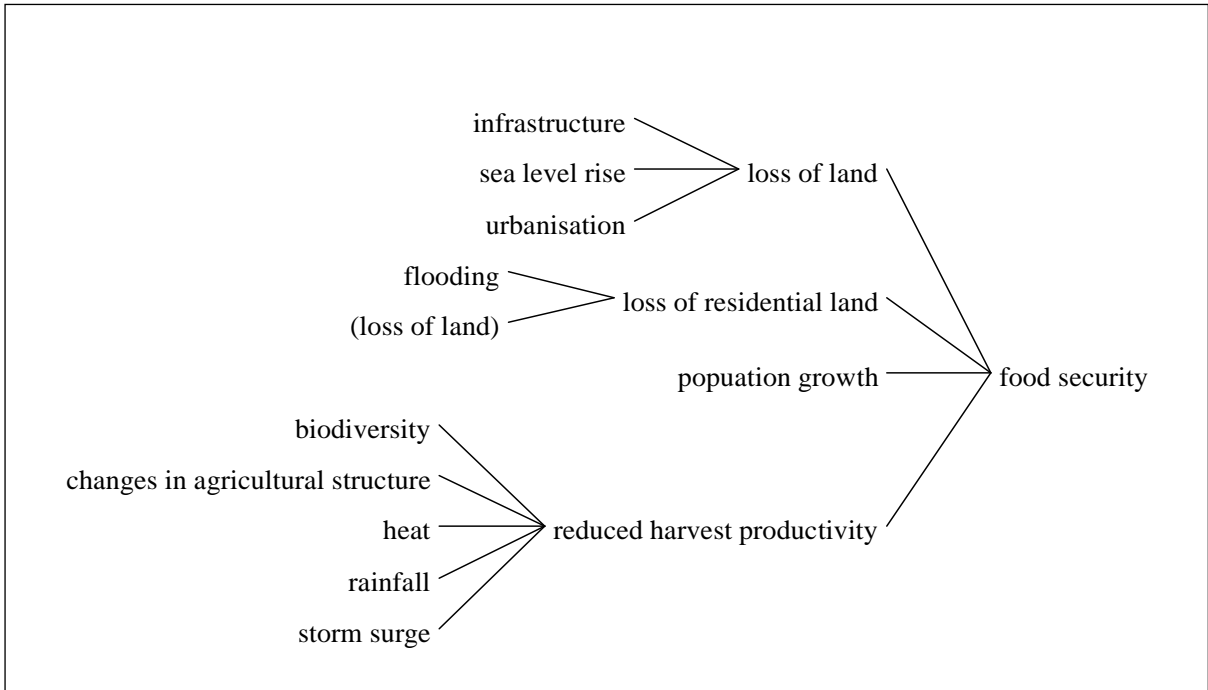
**Figure 18: Direct and indirect causes of reduced harvest productivity**



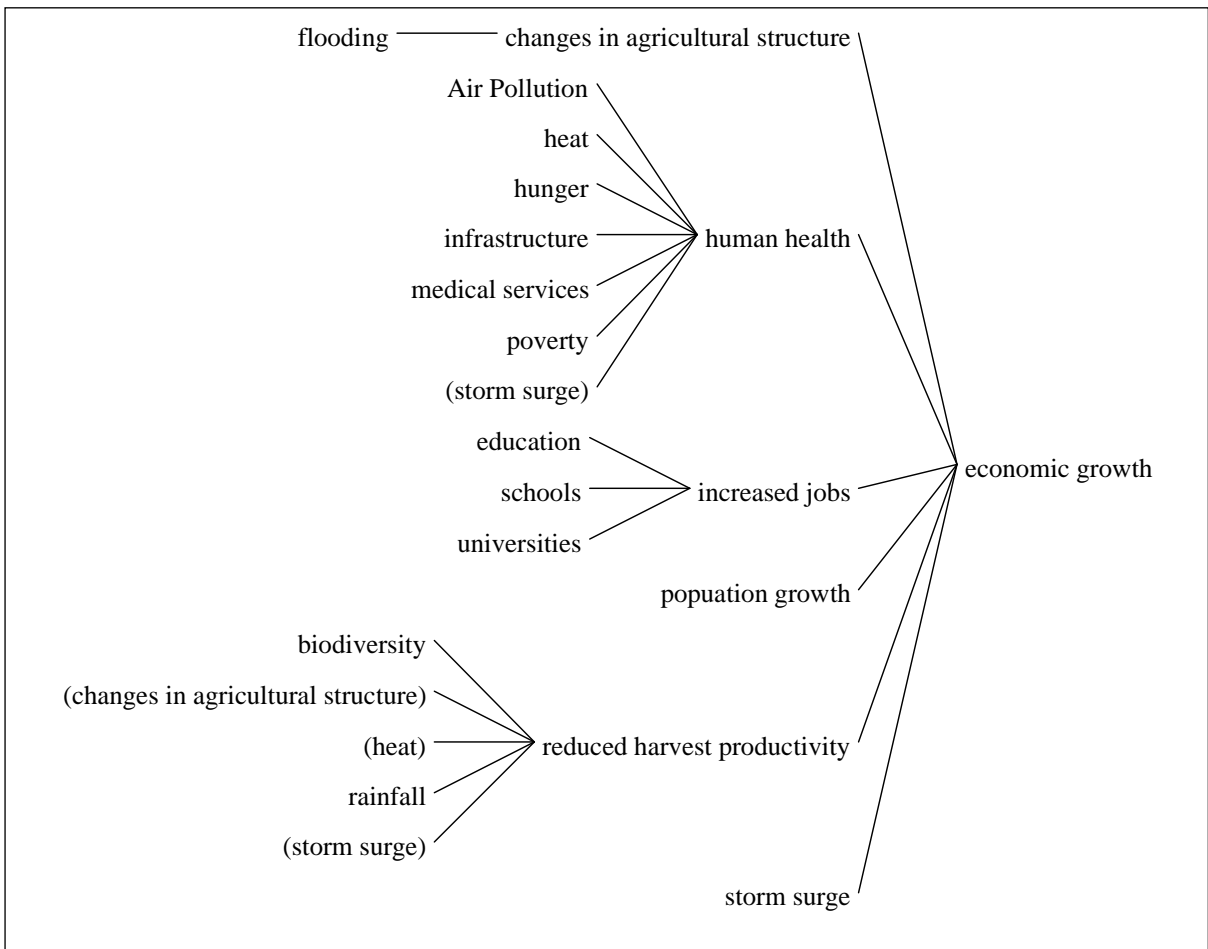
**Figure 19: Direct and indirect causes of reduced aquaculture productivity**



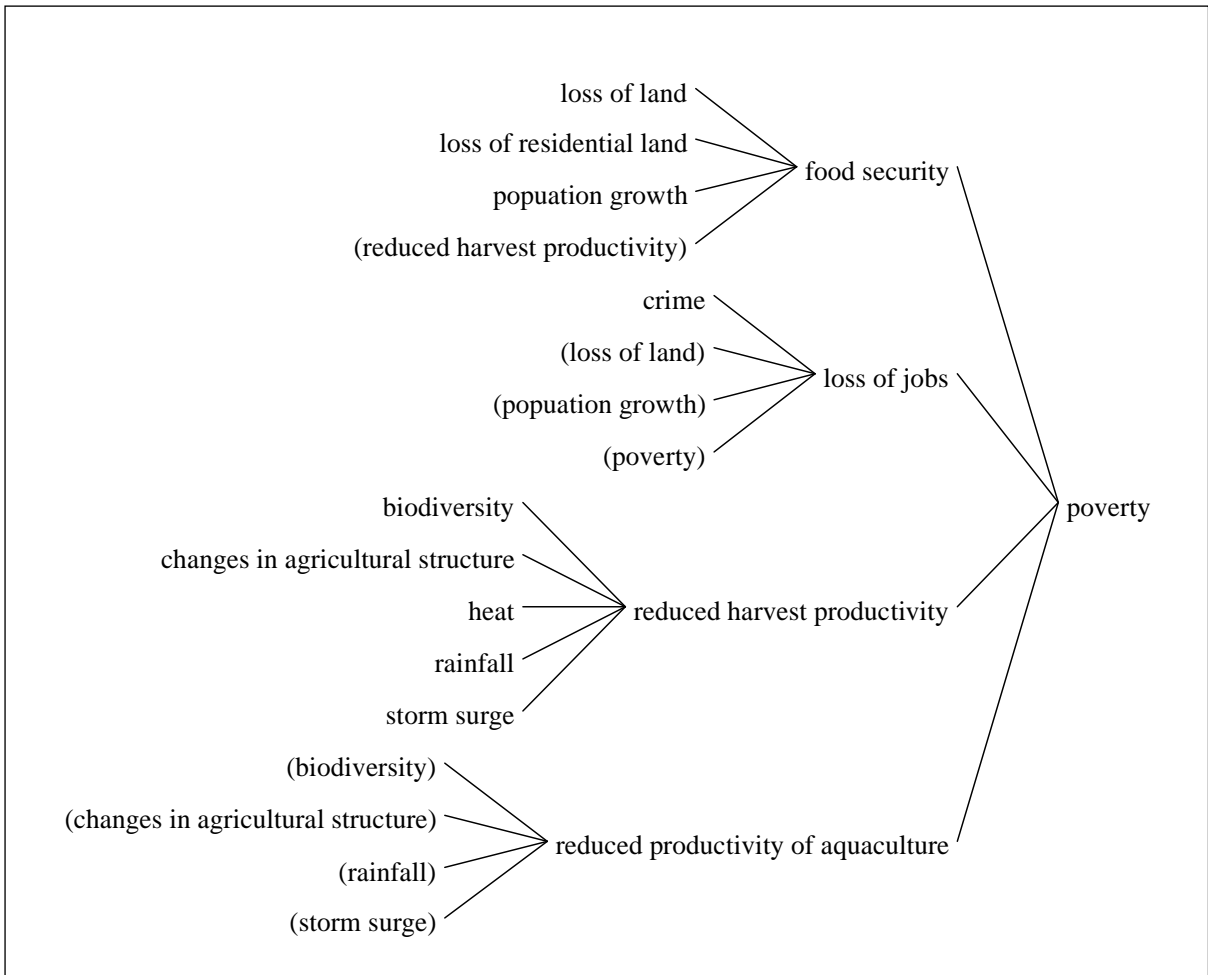
**Figure 20: Direct and indirect causes of human health impacts**



**Figure 21: Direct and indirect causes of food security**



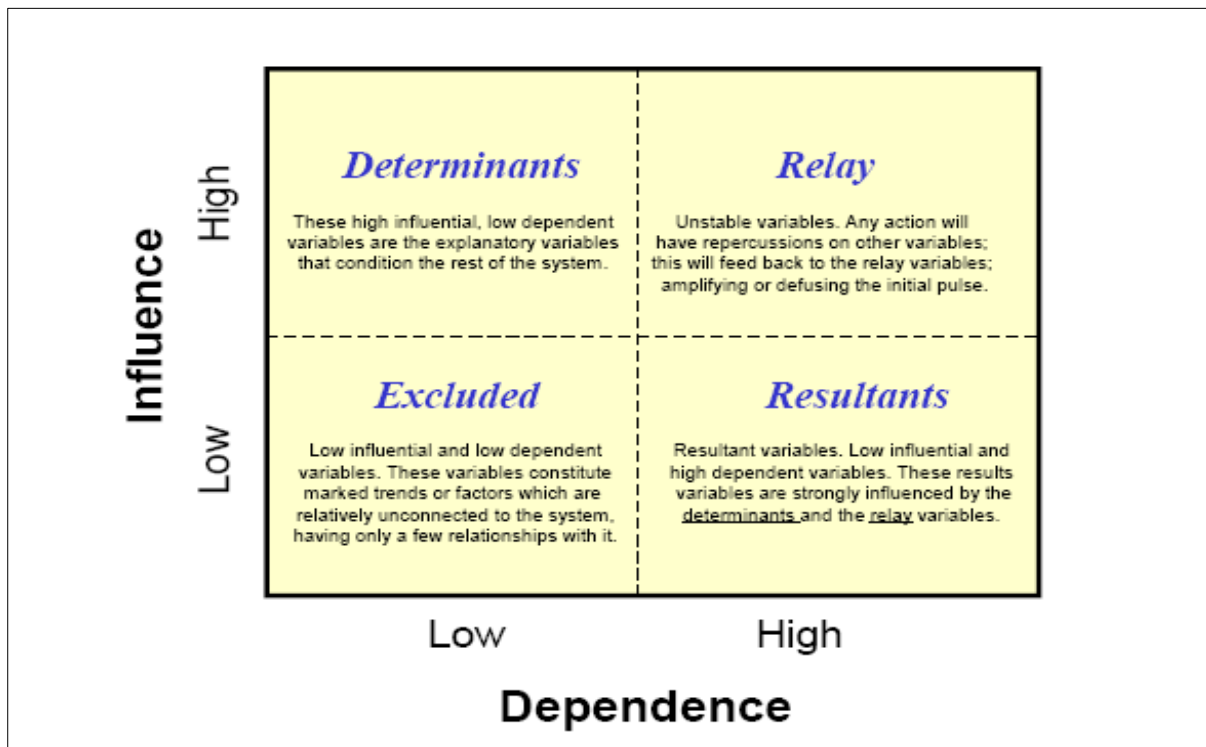
**Figure 22: Direct and indirect causes of economic growth**



**Figure 23: Direct and indirect causes of poverty**

### 5.1.3 Drivers, Relays and Impacts

A framework developed by Godet (1994) was used to explore the relationship of influence and dependence between variables (Figure 24).



**Figure 24: Relationships between variables in terms of influence and dependence**

For the purposes of this study we have replaced the term “determinants” with “drivers”; and the term “resultants” with “impacts”. However, the description by Godet (1994) for each type of variable remains the same.

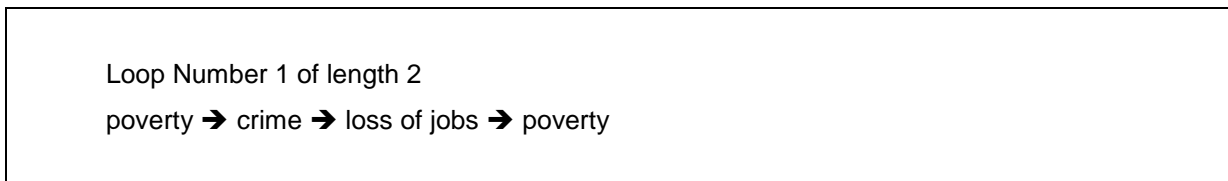
Through analysing the system diagram, 4 drivers, 27 relay variables and 7 impact variables were identified (Table 4). The key system driver was “storm surge” (7 outputs) followed by “population growth” (4 outputs). The relay variables that affected the highest number of other variables included “poverty” (6 outputs); “urbanisation” (5 outputs); and “reduced harvest productivity”; “loss of land”; “infrastructure”; and “changes in agricultural structure” (each with 4 outputs). ICAM interventions in these areas may influence the largest number of other variables in the system. However, more detailed research is needed to determine the potential magnitude of the success of those interventions (e.g. a much larger proportion of the condition of a variable may be attributed to one other variable rather than influence being equally spread among all contributing variables).

**Table 4: ICAM Drivers, Relays and Impacts**

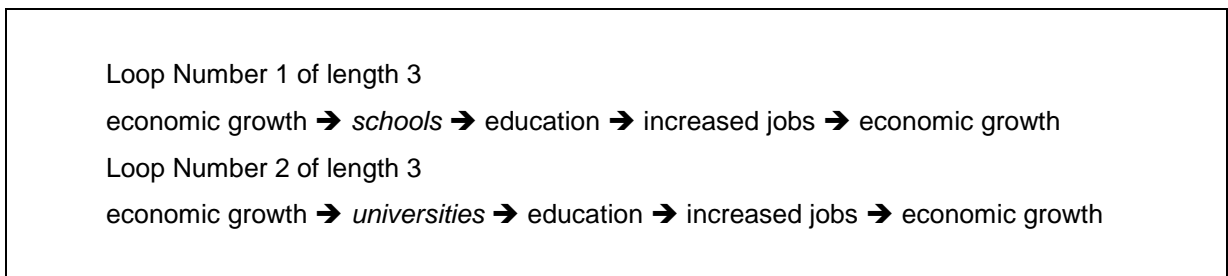
<b>Drivers</b>	<b>Inputs</b>	<b>Outputs</b>
Storm surge	0	7
Population growth	0	4
Rainfall	0	3
Sea level rise	0	3
<b>Relays</b>		
Human health	7	1
Economic growth	6	2
Reduced harvest productivity	5	4
Flooding	5	3
Poverty	4	6
Reduced productivity of aquaculture	4	2
Food security	4	2
Hunger	4	1
Loss of jobs	4	1
Loss of land	3	4
Education	3	2
Increased jobs	3	1
Infrastructure	2	4
Loss of residential land	2	3
Urbanisation	1	5
Changes in agricultural structure	1	4
Heat	1	3
Biodiversity	1	2
Schools	1	2
Universities	1	2
Loss of mangroves	1	1
Hard/impermeable surfaces	1	1
Air pollution	1	1
Medical services	1	1
Crime	1	1
Income	1	1
Industrial, commercial & services production	1	1
<b>Impacts</b>		
Land use change	3	0
Increased harvest productivity	1	0
Transportation	1	0
Gender inequality	1	0
Financial inequality	1	0
Public awareness	1	0
Resettlement	1	0

#### 5.1.4 Examples of feedback loops among ICAM issues

Analysis of the system diagram revealed two feedback loops (Figures 25 and 26). The first related to poverty, crime and loss of jobs. The second related to economic growth, education, and increased jobs, which was influenced by both schools and universities. Feedback loops may represent self-reinforcing influences through the system. For example, in the first case (Figure 25), increased levels of poverty may lead to increased crime, which may lead to further losses of jobs and even greater levels of poverty. In the second case (Figure 26), increased access to schools and universities may lead to increased education, which may lead to increased jobs and economic growth, which in turn may enable increased access to schools and universities. However, there may also be negative impacts from economic growth that need to be considered. For example, economic growth may lead to disparities in wealth distribution and adversely affect social cohesion. Similarly, economic growth has the potential to lead to over-consumption and adversely affect pollution and waste.



**Figure 25: Feedback loop relating to poverty, crime and loss of jobs**



**Figure 26: Feedback loops relating to economic growth, education and increased jobs**

#### 5.1.5 Priority issues and perceptions of capacity

Based on the systems conceptualisation, the various stakeholder groupings (i.e. agriculture and rural development; aquaculture; planning/coordination and environment; districts; and “other”—including the military, the Women’s Union, and other organisations) selected the key ICAM issue for their sector/s and identified the barriers and opportunities to managing them (Tables 5 to 9).



**Table 5: Priority issues and perceptions of capacity for the agriculture and rural development sectors**

Prioritised issue: <b>Water resource management</b>	
Current management capacity: <i>medium</i>	
<b>Barriers</b>	<b>Opportunities</b>
<ul style="list-style-type: none"> <li>▪ Lack of funds</li> <li>▪ Production planning among provinces not synchronized</li> <li>▪ Lack of environmental monitoring devices</li> <li>▪ Lack of human resources in management</li> <li>▪ Erosion of sea dykes and river dykes</li> <li>▪ High tide</li> </ul>	<ul style="list-style-type: none"> <li>▪ Available master plan</li> <li>▪ International cooperation</li> <li>▪ Consensus of localities</li> <li>▪ In the essential economic zone of Mekong Delta</li> <li>▪ Convenient transportation system</li> </ul>

**Table 6: Priority issues and perceptions of capacity for the aquaculture sector**

Prioritised issue: <b>Environment for aquaculture production</b>	
Current management capacity: <i>low</i>	
<b>Barriers</b>	<b>Opportunities</b>
<ul style="list-style-type: none"> <li>▪ No separation in drainage system</li> <li>▪ Public awareness on environmental protection</li> <li>▪ Ineffective waste management</li> <li>▪ Abuse of agricultural chemicals</li> <li>▪ Fast speed of industrial aquaculture production</li> <li>▪ Insufficient and weak monitoring system</li> <li>▪ Insufficient and weak human resources</li> <li>▪ Coordination between sectors and localities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Approaching international and domestic experts, science and technology</li> <li>▪ International cooperation (GIZ, World Bank, ...)</li> <li>▪ Support and interest from government</li> <li>▪ Available standard procedure for aquaculture</li> </ul>

**Table 7: Priority issues and perceptions of capacity for the planning/coordination and environment sectors**

Prioritised issue: <b>Sea level rise &amp; salinisation</b>	
Current management capacity: <i>medium</i>	
Barriers	Opportunities
<ul style="list-style-type: none"> <li>▪ Agricultural production</li> <li>▪ Biodiversity</li> <li>▪ Salinisation of freshwater</li> <li>▪ Income</li> <li>▪ Poverty</li> <li>▪ Public awareness</li> <li>▪ Health</li> <li>▪ Salinisation prevention system (dyke, sluice gates) not sufficient for resistance</li> <li>▪ Livelihood of coastal communities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increasing water area for aquaculture production</li> <li>▪ Research on adaptation</li> <li>▪ Capacity building, public awareness raising</li> </ul>

**Table 8: Priority issues and perceptions of capacity for the districts**

Prioritised issue: <b>Aquaculture</b>	
Current management capacity: <i>medium</i>	
Barriers	Opportunities
<ul style="list-style-type: none"> <li>▪ Weather (<i>medium</i>)</li> <li>▪ Ineffective environmental management (<i>low</i>)</li> <li>▪ Complicated diseases (<i>low</i>)</li> <li>▪ Ineffective infrastructure for aquaculture zone (<i>medium</i>)</li> <li>▪ Ineffective management in seedlings, medicine, food, veterinary (<i>medium</i>)</li> <li>▪ Limited application of science and technology (<i>medium</i>)</li> <li>▪ Unstable market prices (<i>low</i>)</li> <li>▪ Lack of funds for production (<i>medium</i>)</li> <li>▪ Unreliable quality of products → difficulty in consumption (<i>medium</i>)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Available planning on aquaculture zone (<i>high</i>)</li> <li>▪ Favourable geographic position (<i>high</i>)</li> <li>▪ Abundant local labour resources (<i>medium</i>)</li> <li>▪ Interest and investment from government (funds) (<i>medium</i>)</li> <li>▪ Opportunities for development of urban infrastructure, transportation, irrigation, electricity ... (<i>medium</i>)</li> <li>▪ Development of enterprises of seafood processing for export (<i>high</i>)</li> <li>▪ Approaching market (<i>medium</i>)</li> <li>▪ Approaching science and technology (<i>medium</i>)</li> </ul>

**Table 9: Priority issues and perceptions of capacity for other stakeholders**

Prioritised issue: <b>Public awareness</b>	
Current management capacity: <i>low</i>	
<b>Barriers</b>	<b>Opportunities</b>
<ul style="list-style-type: none"> <li>▪ Low educational level in the population</li> <li>▪ Low community responsibility</li> <li>▪ Lack of effective models for learning experience</li> <li>▪ Lack of funds for training, education, capacity building on ICAM</li> <li>▪ Low public awareness</li> </ul>	<ul style="list-style-type: none"> <li>▪ Potentials in human resources and means for communication and public awareness raising</li> <li>▪ Interest from government in education, communication and public awareness raising</li> <li>▪ Available conditions for development and implementation of models to orient community activities into ICAM</li> <li>▪ Active support from international and domestic NGOs</li> </ul>

The perceived capacity to manage the issues ranged from low to medium and the cross-cutting barriers included:

- Poverty/income/funds;
- Public awareness/education;
- Human capital;and
- Insufficient monitoring.

## 5.2 Applied futures studies

The systems conceptualisation developed on the first day of the workshop was used as the basis of the futuring approach in order to extend the levels of critique, questioning and analysis for a projected ICAM 2025 future. The systems conceptualisation results prepared participants to move **from** a rational and systems space **to** a creative futures thinking space. The results of the futures approaches are presented and discussed in the following sections.

### 5.2.1 Mapping the Future' through the Futures Triangle

There were two main questions to be answered as part of the futures exercise:

- What 'will' the future for Soc Trang and coastal management be like in the year 2025?
- What 'is' the preferred future for Soc Trang and coastal management in the year 2025?

To explore the first question of what 'will' (*forecasting question*) the ICAM future look like in 2025, the use of the futures triangle method was used. Each of the five groups (i.e. agriculture and rural development; aquaculture; planning/coordination and environment; districts; and "other"—including the military, the Women's Union, and other organisations) completed a futures triangle on the future of ICAM in Soc Trang by 2025 (Table 10 and Appendix 3).

**Table 10: Futures Triangle Results**

Group name	Themes
<b>Planning / Coordination &amp; Environment</b>	This group identified a large range of barriers to achieving the <i>forecasted</i> future image of effective multi-sectoral coordination with ICAM. Some of these barriers were based on issues of either noncompliance or ignorance by locals to regulatory frameworks. Some core drivers of change were the continued exploitation of the natural resources.
<b>Agriculture &amp; Rural Development</b>	This group identified a <i>forecasted</i> future image of an ICAM approach that addressed the Soc Trang ability to sustain dykes, forests and water resources. Some of these barriers to this future were based on limited funding and limited public awareness of the rationale for sustaining these resources. Some core drivers of change were the continued expansion of international cooperation and unsustainable natural resource practices.
<b>Aquaculture</b>	This group identified a <i>forecasted</i> future image of an ICAM approach across Soc Trang that embraced multi-sectoral participatory and collaborative approaches. Some of the barriers to this future were based on silos resulting from singular sector development and limited community awareness in ICAM.  Some core drivers of change identified were the continued concern for climate change and unsustainable natural resource practices.
<b>Districts</b>	This group identified a <i>forecasted</i> future image of an educated ICAM community and sustainable use of coastal resources. Some of the barriers to this future were based on issues of economic funding, integrated planning and community ignorance with ICAM approaches. A core driver of change identified was the continued exploitation of natural resources.
<b>Other</b>	This group identified a <i>forecasted</i> future image of an effective master planned ICAM approach. Some of the barriers to this future were based on issues of sectoral coordination or ignorance by locals to an ICAM plan or cultural habits in conflict with the ICAM plan. Some core drivers of change identified were the support from international agencies, provincial plans and depleting natural resources

Findings were discussed between groups to share lessons and to encourage reflection on their own Futures Triangle results. This activity provided deeper insights into the assumptions and perspectives of others. This activity also cultivated levels of participant agency in generating solutions.



Deepening the participant agency and leadership in strategic foresight

**Figure 27: Participant leadership in declaring plausible futures**

**Key Message**

**The futures triangle maps three dimensions shaping the future:**

- The push of the future aims to identify the core drivers of change and is understood in present context. In assessing the results of the five groups, the assumptions made by the groups suggest that the main push of the future for Soc Trang is a need for planning. Consideration of the forecasted images for this province, generated by participants in these workshops, may contribute to participatory planning approaches that are not dominated by external factors or top-down approaches to planning.
- The pull of the future aims to identify and map participant’s images and/or ideas of the future forecasted based on the context being studied i.e. integrated coastal area management. The pull of the future attempts to identify the many competing forecasts of the future. The range of forecasted images made by each of the groups suggests a range of images indicative and supportive of ICAM planning. Image results reflected multi-disciplined, educative, participatory and integrated approaches to ICAM. Most images were complementary rather than conflicting or contesting.
- The weights dimension is situated in a historical context and aims to identify those barriers that may slow down or inhibit the ability to attain futures as forecasted. Weights can also serve as a useful dimension to potentially check the alleged wisdoms of the images from the future forecasted. The majority of barriers identified related to limited: funding, community awareness of ICAM approaches, and enforcement or development of planning policy.

In understanding these three dimensions a plausible future scenario can be developed by participants. However, the futures triangle dimensions can also be imbalanced. Thus, participants were asked to identify answers to the following questions:

Q1: How balanced are the internal / external dimensions of our futures triangle?

Q2: Where should we strategically intervene in the Soc Trang & coastal management 2025 Futures Triangle? (images, pushes, weights)

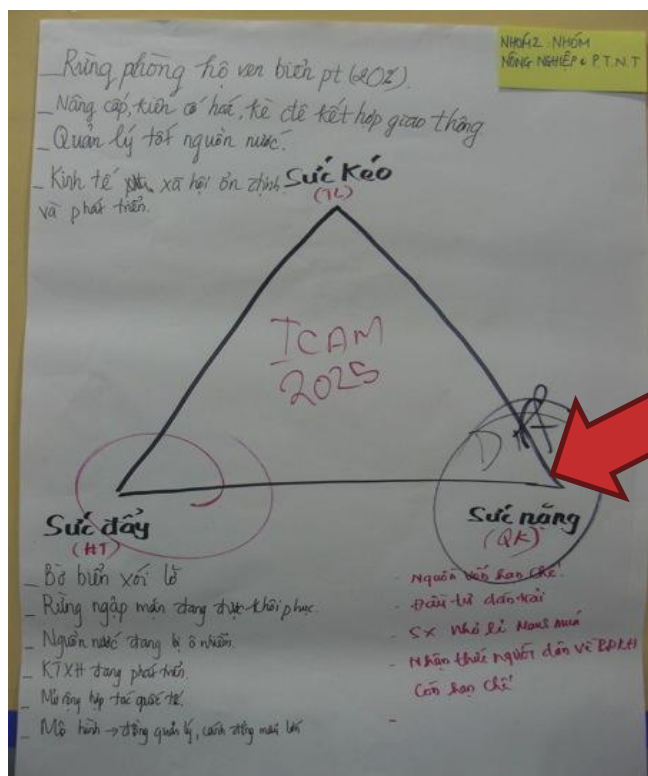
Q3: Which is easiest to change? Why?

Q4: Which is most difficult? Why?

The results to the question of what was easiest to change by groups can be seen in Table 11 and Figure 28 below.

**Table 11: Ease of change**

Group	Easiest	Most difficult
Planning/Coordination & Environment	Push (Present)	Weight (Past)
Agriculture & Rural Development	Push (Present)	Weight (Past)
Aquaculture	Push (Present)	Weight (Past)
Districts	Push (Present)	Weight (Past)
Other	Pull (Future)	Weight (Past)



**Weights**  
 Participants' main dimension (except 1 group) recognised as a priority for future strategies and actions.

**Figure 28: Determining priorities for action**

### **Determining priorities for action**

As can be seen from the results of the futures triangle, there is unanimous agreement across all workshop groups in support of developing a networked, participatory and integrated ICAM plan for 2025. The results also suggest that this plan would need to be supported by both educational and governance programs and/or activities to support the successful implementation of the ICAM planning process and ensure the mutual accountability of stakeholders.

The five groups also identified that strategies and actions would be required, as a matter of priority, to be developed as a means to counter the barriers to achieving the forecasted future of ICAM planning. Failure to address the weights identified by the participants from the Soc Trang workshop would most likely de-rail planning efforts to accomplish the ICAM future. These weights can also represent risks to an ICAM future.

### **5.2.2 Creating Alternatives' through Scenarios**

The next step in the Soc Trang ICAM workshop was to use the results of the futures triangle to develop scenarios for ICAM in 2025. Participants were asked to respond to the following questions:

Q1: How would your group describe the preferred future scenario for Soc Trang & ICAM in 2025?

Q2: How would your group describe the collapsed future scenario for Soc Trang & ICAM in 2025?

Participants were asked to populate two scenarios, one preferred and one collapse for Soc Trang and ICAM (Table 12 and Appendix 4). The structure of the scenarios used a framework of STEEPV (social, economic, environmental, political and values).

**Table 12: Collapse and Preferred Scenarios**

<b>Group</b>	<b>Collapse</b>	<b>Preferred</b>
Planning/Coordination & Environment	No one cares about others or the environment; we exploit without protecting ourselves and the environment	Integrated management and zoning of the coastal zones.
Agriculture & Rural Development	The opposite of the preferred	A technologically advanced community that is stable in terms of sustainable development
Aquaculture	Poor quality of life exacerbated through collapse of natural resources	Sustainable and informed economies working through participation, harmonising and knowledge
Districts	Limited access and use of technologies leads to decreasing quality of life and natural resources	Progressive and politically stable communities limiting the harm to natural resources through bio technologies
Other	Social divide increased by limited access to and management of natural resources	Sustainable developments create equity and balance in access and use of natural resources

### **Key Message from Scenarios**

The outcomes of the scenario development reinforce the message from workshop participants that a preferred scenario includes an integrated and sustainable ICAM plan. Furthermore, the preference for a broad stakeholder base recognises the need for efficiency and agency within the development and implementation of the plan.

In terms of the collapse scenario there is a strong theme of apathy, individuality, and ignorance with the degradation of natural resources as a core driver of the collapse. This ignorance may be associated with a perception of limited knowledge in adaptation concepts, knowledge or strategies.

Workshop participants were then asked to identify the two most desired elements/fears for the two ICAM scenarios (Table 13) and the actions to either prevent a collapse scenario and/or realise a preferred scenario (Table 14). The purpose of this activity was to encourage the workshop participants to focus on prioritising actions to prevent, monitor and create these scenarios.

**Table 13: Main ICAM scenario thematic**

<b>Group</b>	<b>Main fears from collapse scenario</b>	<b>Main desired elements in preferred scenario</b>
Planning/Coordination & Environment	No one cares about each other Exploitation without protections	ICAM Zonation of the coastal zones
Agriculture & Rural Development	The diminished quality of life in the Soc Trang community The diminished quality of environment/natural resources in the Soc Trang community	A developed and educated Soc Trang community Sustainable development in Soc Trang
Aquaculture	Limited community consensus on the Soc Trang ICAM/community futures Limited community education on adaptation methods for the Soc Trang ICAM/community futures	An educated Soc Trang community in ICAM A flourishing Soc Trang community future in terms of education and sustainable development
Districts	Natural disasters for Soc Trang Diminished quality of life for Soc Trang communities	Technologies protect Soc Trang futures Increased quality of life for Soc Trang communities
Other	Economic divide widens in the Soc Trang communities through limited access to natural resources The diminished quality of environment/natural resources in the Soc Trang community	Increased quality of life for Soc Trang communities through equity of access to resources A flourishing Soc Trang community future in terms of sustainable development



**Table 14: Main priority action by scenarios**

<b>Group</b>	<b>Main actions, by theme, to prevent collapse</b>	<b>Main actions, by theme, to realise preferred</b>
Planning/Coordination & Environment	Coordination, collaboration and co-management of ICAM accountabilities	Implement ICAM across Soc Trang Governance for ICAM across Soc Trang
Agriculture & Rural Development	No results	Implement ICAM across Soc Trang
Aquaculture	Implement ICAM across Soc Trang Economic development for ICAM infrastructure	Coordination, collaboration and co-management of ICAM accountabilities Economic development for ICAM infrastructures
Districts	Enhancing public awareness of ICAM through education Enhancing public adaption to climate change through ICAM education	Increase cross sectoral economic development opportunities Situate and link ICAM planning policies within Soc Trang governance systems/ intuitions
Other	Enhancing public awareness of ICAM through education Implement ICAM across all Soc Trang communities	Deployment of ICAM planning and supported by organisations/policies Enhancing public awareness of ICAM through education

Analysis of Tables 13 and 14 demonstrates that stakeholders see ICAM planning activities as creating greater levels of certainty into the future by sustaining the coastal areas in Soc Trang and conserving natural resources. This is also seen as a means of mitigating the likelihood of a collapse scenario. In addition, planning is seen as being collaborative, participatory and networked, rather than been driven by experts or hierarchal approaches that have to dominated traditional planning approaches.

### 5.2.3 Creating Transformations' by Visioning and Back Casting

The final step in the Soc Trang ICAM workshop was to use the results from the integrated and preferred scenario as a means to imagine the collective visions for Soc Trang / ICAM in 2025. The back casting exercise aimed to identify the relevant actions that stakeholders may consider to achieve preferred ICAM futures. In visioning, the participants were asked to undertake a creative visualisation and then record their visions on vision cards (Figure 29). The vision cards are seen in a futures study as an important cultural artefact that reflects narrative and a method to align day-to-day actions to the vision.



Collecting the visions acknowledges the visions as important cultural artefacts.

Figure 29: Collecting the visions

#### Results from the visioning method

Three main themes emerged across the 61 visions generated that related to Soc Trang being clean, sustainable, and socially just (Table 15). The collective content of these visions represents a new and powerful narrative for the future of Soc Trang and should be retained and referred to in present and future processes.

Table 15: Example thematic visions for Soc Trang ICAM in 2025

Thematic visions	
Clean Soc Trang	Participatory and collaborative Soc Trang
Sustainable Soc Trang	Modern, technical, and beautiful Soc Trang
Socially just Soc Trang	Planned and resource-conserved Soc Trang

#### Note on visioning

Please note that, within this report, the report authors have discerned the core messages from the visions presented. However, it is the participants and agents who are affected that are most qualified to synthesise these visions. As such, workshop participants should be invited back to wordsmith the final Soc Trang / ICAM 2025 vision statements to ensure validity.

### **Results from the back casting method**

The aim of back casting was to remember the ICAM 2025 future by identifying the steps that occurred between 2012 and 2015 to achieve the ICAM 2025 future. The workshop participants were asked to plan backwards, using their vision cards as a guide, and identify a key activity, event, decision or action over four temporal zones (2025, 2020, 2015 and 2012) that occurred on the pathway to achieving their 2025 visions. Thirty six back casting cards were recorded and collected during the workshop (Appendix 6).

### **Key message on back casting**

In the interest of creating priorities in 2012/2013, there is a need to focus on the results for 2012 (Table 16). The back casting results demonstrate that there is a consistent desire to commence the ICAM 2025 planning and community education as a strategic priority in Soc Trang.

**Table 16: Back casting actions for ICAM 2025**

<b>Timeframes</b>	<b>Strategies / Actions to achieve the visions</b>
<b>2025</b>	(see Appendix 6 for details)
<b>2020</b>	(see Appendix 6 for details)
<b>2015</b>	(see Appendix 6 for details)
<b>2012</b>	Commence ICAM 2025 planning; Communication with the community Marketing of ICAM 2025; Identification of ICAM 2025 stakeholders; Develop capacity in ICAM 2025 leaders through strategy development; Planning ICAM 2025 commences; Fund and resourcing of ICAM 2025 as a project; Establish ICAM project team Mobilisation of public participation methods to support ICAM 2025; Education for sustainability in natural resource use; Implement actions for sustainability in natural resources.

### 5.3 Adaptive capacity assessment

The results of the: (i) Perceived importance of the six capitals needed to achieve ICAM in Soc Trang; (ii) Perceptions of internal capacity; and (iii) Perceptions of provincial capacity, are illustrated in Figures 30, 31, 32 and 33.

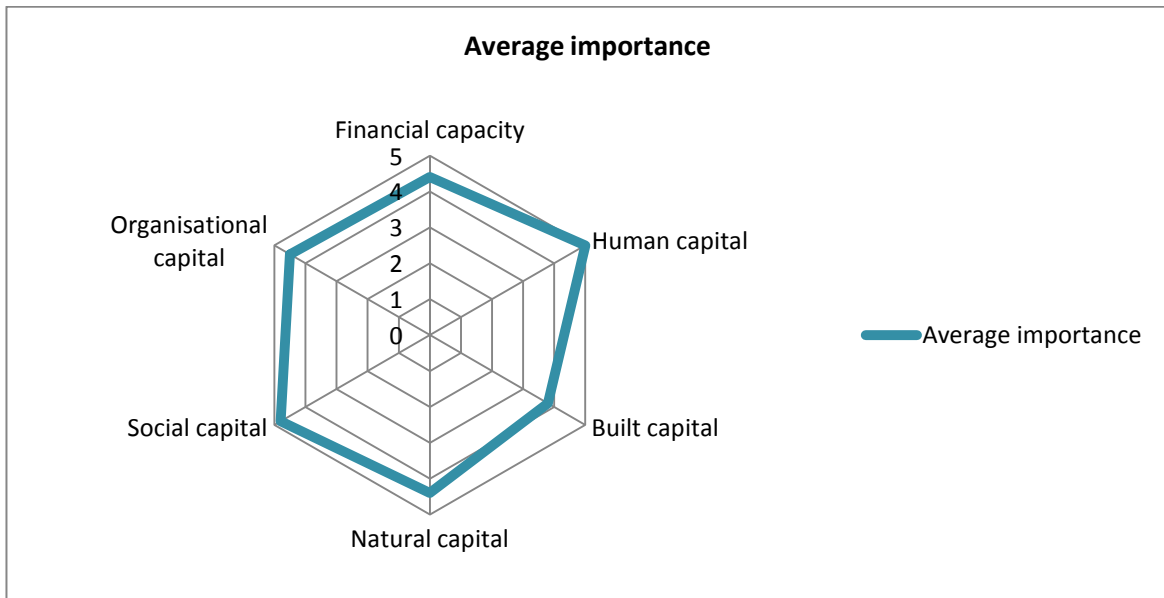


Figure 30: Perceived importance of various capitals to achieve ICAM in Soc Trang

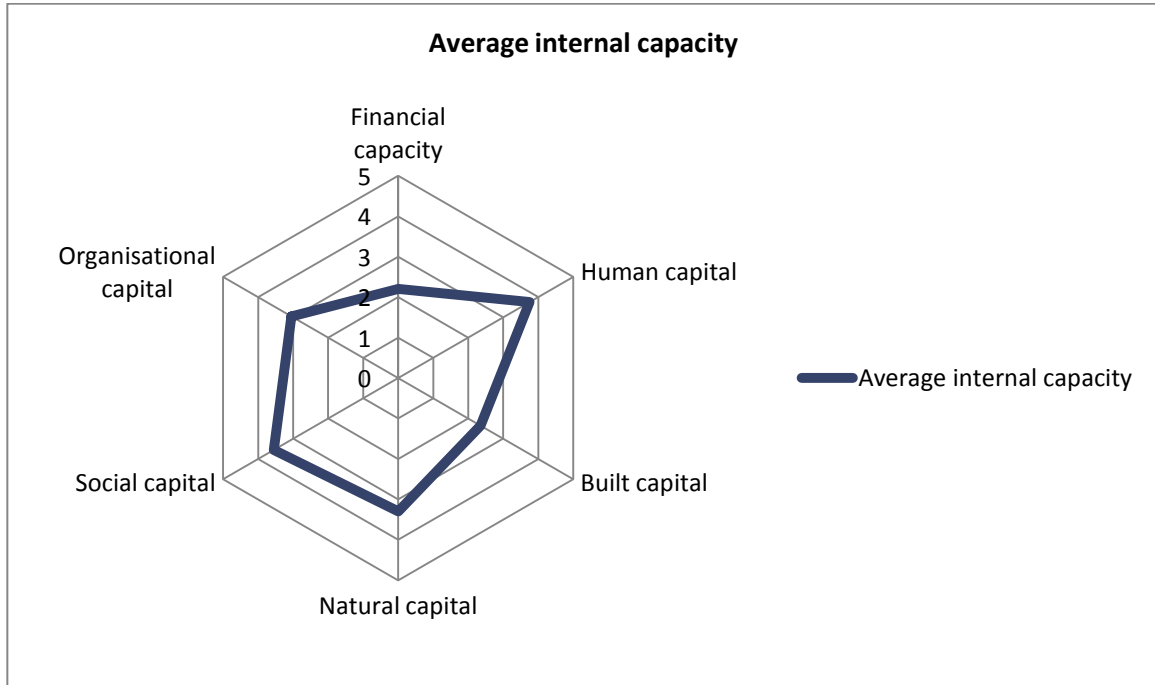
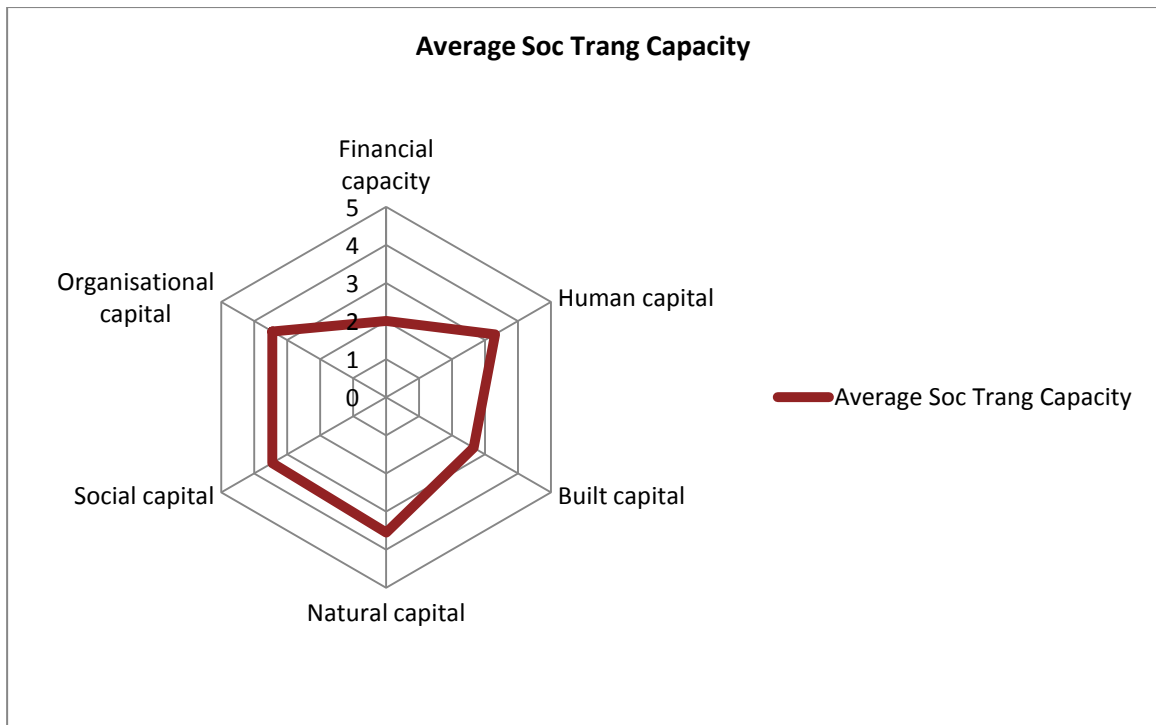
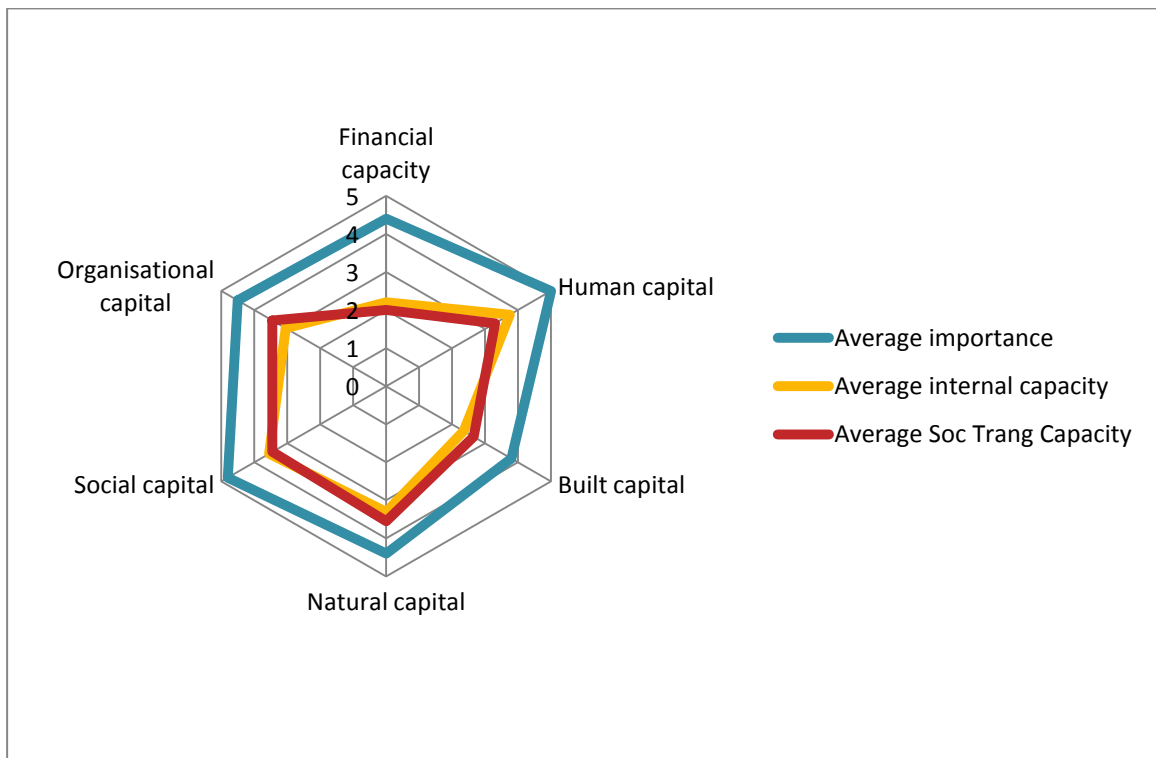


Figure 31: Perceived internal capacity to achieve ICAM in Soc Trang



**Figure 32: Perceived provincial capacity to achieve ICAM in Soc Trang**



**Figure 33: Integration of various perceptions of capacity to achieve ICAM in Soc Trang**

Human and social capital were identified by key informants as the most important of the six capitals needed to achieve effective ICAM in Soc Trang (Figure 30). However, all of the six capitals were rated highly in terms of importance. Contrary to the emphasis on engineering protection works, built capital (while still rated as important) was considered the lowest priority of the six capitals—even following a

recognition that both internal and provincial built capital levels were lacking (Figures 31 and 32 respectively). Financial capital was considered to be the least available of all the capitals at both the internal and provincial scales but was not rated as highly in importance as human, social or organisational capital (Figure 33). Natural capital levels were considered high and relatively important to ICAM (Figure 33). Perceived levels of the six capitals were consistent in terms of internal and provincial capacity (Figure 33). ICAM initiatives need to address capacity differentials (i.e. capitals where there are large differences between existing levels of capital and their perceived importance such as financial capital) and the need to maintain capacities that are considered important and currently exist in high levels (e.g. social, human and organisational capital).

## **6. ICAM implications**

One of the primary challenges of ICAM is the identification of a common vision for the future among the diverse stakeholders with interests in the coastal zone. The identification of a common vision relating to sustainable livelihoods among all stakeholders participating in the systems and futures workshop provides a solid foundation for future ICAM success in Soc Trang. However, there will be several challenges associated with the pathways to achieve that vision, which will be compounded by issues such as climate change.

The systems approach highlighted the diverse interplay between variables related to ICAM (78 connections identified) and indicates that isolated ICAM interventions may have unintended consequences. For example, over 70% of the 38 variables identified by workshop participants provided a relay function; whereby they were identified as potentially impacting on one or more other variables. Hence, ICAM interventions should not only target the key system drivers (i.e. storm surge and population growth) but also relays that affect a high number of other variables in the coastal zone system (i.e. poverty, urbanisation, reduced harvest productivity, loss of land, infrastructure, and changes in agricultural structure). Similarly, feedback loops, which are self-reinforcing, should also be targeted. However, the magnitude of impacts resulting from those drivers, relays, and feedback loops (and thus the magnitude of the success of an intervention) need to also be considered.

In addition, several priority issues were identified by various sectors including water resource management for agricultural and rural development; environmental conditions for aquaculture production; sea level rise and salinisation; and public awareness. However, while there were several opportunities identified to manage these issues (e.g. international cooperation, consensus among the districts, support and interest from government, and increasing research), the perceived current capacity to manage the priority issues was only considered to be low or medium. Several barriers were identified to managing the priority issues but the barriers that applied to all priority issues included: (i) poverty/income/funds; (ii) public awareness/education; (iii) human capital; and (iv) insufficient monitoring. These barriers were also reinforced through the futures activities. Hence ICAM initiatives may have more impact on priorities for the province if they address these barriers.

The types of interventions to address ICAM issues should also address the enabling capital needed to underpin the effectiveness of those interventions. All six capitals (social, human, organisational, financial, built and natural) were identified as being of high importance. However, human and social capital were rated as being of the highest importance—this emphasises the recognition among stakeholders that effective ICAM occurs through social processes. Different types of capacity building activities may be needed to either improve or maintain various capitals. For example, financial and built capital were identified as being lacking in Soc Trang and may require more systemic actions; whereas actions relating to social, human and organisational capital may require continued investment in approaches already proven successful.

ICAM initiatives should also be cognizant of bio-physical boundary conditions. For example, ICAM initiatives need to respond within the bounds of future climate conditions (more intense rainfall events, increased temperatures, greater storm surge, and sea level rise). Similarly, ICAM initiatives should acknowledge that the socio-economic conditions of Soc Trang are changing. For example, Soc Trang is rapidly urbanising with significant changes in economic structure projected for the coming two

decades (i.e. dramatic projected increase in the relative contribution of the services sectors to gross regional product). However, socio-economic and bio-physical trends may alter, which necessitates an adaptive management approach.

The expansion of the aquaculture areas also has implications for the types of response to climate change. It is likely that increased protection measures such as dykes will be needed to protect existing and new aquaculture farms and processing facilities from the multiple climate change impacts of storm surge, sea level rise, and flooding. However, protection works are costly and may be redundant over longer timescales. Hence, a holistic view focused on long-term priorities, combined with an acknowledgement of both socio-economic and bio-physical trends, is needed for informed investment decisions in the coastal zone.

Tourism is emphasised in the Soc Trang Master Plan for 2020, however, it was not identified as part of the systems or futures workshop. Many other South East Asian countries have developed or are attempting to develop tourism as a stimulant for economic development. While tourism may have benefits such as attracting international investment, there may be a number of adverse impacts relating to social and cultural factors, and diversion of resources for tourism infrastructure. Whatever strategy is adopted for promoting 'development' (in all forms) it must be cognisant of the direct and indirect consequences from these initiatives. Comprehensive strategies may include avenues for transition from one course of action to another through adaptive management processes, which can be difficult once a course of action with path dependencies is embarked upon. Strategies that use revenue from one pathway to build the necessary conditions to enable a future alternate pathway represent a means of over-coming such path dependencies.

In summary, a re-occurring message from the study was that a preferred future for Soc Trang stakeholders includes an integrated and sustainable ICAM plan. Furthermore, there was a desire for participatory and equitable access to both the planning and implementation processes. These themes are represented through the various visions for Soc Trang in 2025 (Table 15). Similarly, it is clear from the back casting results that there is a consistent desire to commence the ICAM 2025 planning and community education as a strategic priority in Soc Trang.

## **7. Recommendations**

Recommendations, based on the findings of this project, are:

- Ensure that the preference for sustainable livelihoods remains a key focus for ICAM mechanisms (e.g. through communication emphasis and engagement strategies).
- Approach ICAM as an adaptive learning process through comprehensive monitoring and evaluation (of both on-ground outcomes but also of changes to adaptive capacity – particularly in terms of social and human capital).
- Donor assistance is perceived by stakeholders to have had significant impacts on human and social capital in the province. While donor-reliance should be avoided, there is a rationale for the sharing of global resources within a globalised society—in particular, when addressing global-scale problems that may lead to localised consequences. Hence, there are many opportunities to build on past and continuing donor efforts, while ensuring adequate capacity for self-determinism in engagement processes.
- Develop mechanisms to enhance localised contributions to human and social capital to ensure self-reliance and self-determinism in the longer term. For example, link educational and awareness raising strategies to capacity building efforts more generally using a broad sustainability framework and participatory approaches to adaptive management.
- Work with local communities to develop a suite of alternative and sustainable livelihood strategies that builds on existing strengths. A critical aspect of this is the avoidance of path-dependencies that may arise from the implementation of various ICAM initiatives.

## **8. Conclusions**

There are cumulative pressures on sustainable coastal livelihoods in Soc Trang. These pressures are not unique to Soc Trang. Many coastal areas throughout the world are at risk from sea level rise and the increased intensity of extreme events such as storm surge and flooding. Simultaneously, many areas are also experiencing significant socio-economic challenges associated with rural-urban transitions, population growth, and increased consumption resulting from improving gross regional product. The findings of this study indicate consensus among stakeholders that sustainable livelihoods should form the overriding goal of coastal management. A focus on sustainable livelihoods is less likely to be maladaptive because stakeholders are not seeking to optimize particular system elements at the expense of others—and thus engaging in a broader decision-making framework supportive of social-ecological resilience. However, the current investment in protection strategies (e.g. dyke building, strengthening, and raising) to continue and expand rice and shrimp production may lead to path dependencies and an ultimate reduction in adaptive capacity for system transformation.



## References

- Adger, W. N. 2002. *Indicators of Social and Economic Vulnerability to Climate Change In Viet Nam*. CSERGE Working Paper GEC 98-02. [www.cserge.ac.uk/sites/default/files/gec\\_1998\\_02.pdf](http://www.cserge.ac.uk/sites/default/files/gec_1998_02.pdf)
- Adger, W.N., S. Agrawala, M.M.Q. Mirza, C. Conde, K. O'Brien, J. Pulhin, R. Pulwarty, B. Smit and K. Takahashi, 2007: *Assessment of adaptation practices, options, constraints and capacity. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 717-743.
- Babel M.S, Pandey V.P, Rivas A.A, Wahid S.M. 2011. Indicator-based approach for assessing the vulnerability of freshwater resources in the Bagmati River basin, Nepal, *Environmental Management*, 48(5): 1044-59.
- Bebbington, A. 1999. Capitals and Capabilities: A Framework for Analyzing Peasant Viability, Rural Livelihoods and Poverty, *World Development*, 27(12): 2021-2044.
- Bourdieu, P. 1986. The forms of capital, In Richardson, J. G. (ed.), *The Handbook of Theory: Research for the Sociology of Education*, Greenwood Press, New York, pp. 241-258.
- Bussey, M. & Slaughter R. 2005. *Futures Thinking for Social Foresight*, Tamkang University Press, Taipei.
- Bussey, M., Carter, R.W., Keys, N., Carter, J., Mangoyana, R., Matthews, J., Nash, D., Oliver, J., Richards, R., Roiko, A., Sano, M., Thomsen, D.C., Weber, E. & Smith, T.F. 2012, 'Framing adaptive capacity through a history-futures lens: Lessons from the South East Queensland Climate Adaptation Research Initiative', *Futures*, vol. 44, pp. 385-397.
- Burton, D., Mallon, K., Taygfeld, P., Laurieerin, E. & Bowra, L. 2009. *Scoping Climate Change Risk for Moreton Bay Regional Council*. <http://www.moretonbay.qld.gov.au/uploadedFiles/moretonbay/environment/Scoping-Climate-Change-Risk.pdf>
- Chaudhry, P. & Ruyschaert, G. 2007. *Climate Change & Human Development in Viet Nam*. A case study for the Human Development Report 2007/2008, UNDP.
- Climate Risk Pty Ltd. 2010. *Climate Change Risk Assessment: Kempsey Shire Council*. Kempsey Shire Council. <http://kempsey.nsw.gov.au/environment/climatechange/pubs/climate-change-risk-assessment.pdf>
- DEFRA 2010. *Self-Assessment guidance and matrix for National Indicator (NI) 188 - Planning to adapt to climate change*. London: DEFRA [Online]. Available from: <http://www.defra.gov.uk/environment/climate/action/local-authorities.htm>.
- Department for Environment and Heritage. 2005. *Adelaide's Living Beaches A Strategy for 2005-2025: Technical Report*. [http://www.environment.sa.gov.au/Conservation/Coastal\\_marine/Adelaides\\_Living\\_Beaches/Re-sources](http://www.environment.sa.gov.au/Conservation/Coastal_marine/Adelaides_Living_Beaches/Re-sources)
- Dasgupta, S. Laplante, B. Meisner, C. Wheeler, D. Yan, J. (2007). *The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis*. World Bank Policy Research Working Paper 4136. [www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2007/02/09/000016406\\_20070209161430/Rendered/PDF/wps4136.pdf](http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2007/02/09/000016406_20070209161430/Rendered/PDF/wps4136.pdf)
- Emery, M. & Flora, C. 2006. Spiraling-Up: Mapping Community Transformation with Community Capitals Framework, *Community Development*, 37(1): 19-35.
- Gidley, J. M., Fien, J. F., Smith, J. A., Thomsen, D. C. and Smith, T. F. 2010, 'Participatory Futures Methods as Social Learning: Towards Adaptability and Resilience in Climate-vulnerable Communities', *Environmental Policy and Governance*, vol. 19, issue 6, pp. 427-440.
- Godet, M. 1994. *From anticipation to action: A handbook of strategic prospecting*. UNESCO Publishing.

- Harley, M., Horrocks, L., Hodgson, N. & van Minnen, J. 2008. *Climate change vulnerability and adaptation indicators*. European Topic Centre on Air and Climate Change Technical Paper, European Environment Agency. [http://air-climate.eionet.europa.eu/reports/ETCACC\\_TP\\_2008\\_9\\_CCvuln\\_adapt\\_indicators](http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2008_9_CCvuln_adapt_indicators)
- Harley, M. & van Minnen, J. 2009. *Development of adaptation indicators*. European Topic Centre on Air and Climate Change Technical Paper, European Environment Agency. [http://air-climate.eionet.europa.eu/reports/ETCACC\\_TP\\_2009\\_6\\_ETCACC\\_TP\\_2009\\_6\\_Adapt\\_Ind](http://air-climate.eionet.europa.eu/reports/ETCACC_TP_2009_6_ETCACC_TP_2009_6_Adapt_Ind)
- Horrocks, L., Mayhew, J., Hunt, A., Downing, T., Butterfield, R. & Watkiss, P. 2005. *Objective Setting for Climate Change Adaptation Policy*. UK: Defra. [http://www.ukcip.org.uk/wordpress/wp-content/PDFs/Objective\\_setting.pdf](http://www.ukcip.org.uk/wordpress/wp-content/PDFs/Objective_setting.pdf)
- Inayatullah, S. 2006. Anticipatory action learning: Theory and practice, *Futures*, 38(6): 656-66.
- Inayatullah, S. 2007. *Questioning the Future: Methods and Tools for Organisational and Societal Transformation*, Third edn, Tamkang University Press.
- Inayatullah, S. 2008. Six Pillars: futures thinking for transforming, *Foresight*, 10(1): 4-21.
- Inayatullah, S. 2008. *Questioning the Future: Methods and Tools for Organisational and Societal Transformations*, Tamkang University Press, Taipei.
- Jones, R.N., 2001: An environmental risk assessment/management framework for climate change impact assessments. *Natural Hazards*, 23(2-3), pp. 197-230.
- Keys N, Bussey M, Thomsen DC, Lynam T & Smith TF, 2013, 'Building Adaptive Capacity in South East Queensland, Australia', *Regional Environmental Change*. (in press, published online). DOI 10.1007/s10113-012-0394-2.
- Lamhauge, N., Lanzi, E. & Agrawala, S. 2012. *Monitoring and Evaluation for Adaptation: Lessons from Development Co-operation Agencies*, OECD Environment Working Papers, No. 38, OECD Publishing. <http://dx.doi.org/10.1787/5kg20mj6c2bw-en>
- Lim, B., E. Spanger-Siegfried, I. Burton, E. Malone, and S. Huq (eds.), 2005: *Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures*. Cambridge University Press, New York.
- Measham, T.G., Preston, B.L., Smith, T.F., Brooke, C., Gorddard, R., Withycombe, G. & Morrison, C. 2011, 'Adapting to climate change through local municipal planning: barriers and challenges', *Mitigation and Adaptation Strategies for Global Change*, vol. 16, pp. 889–909.
- Milojevic, I. 2005. *Educational Futures: Dominant and contesting visions*, Routledge, New York.
- Milojevic, I. 2011. *Why Futures Thinking and What is Futures Thinking*, University of the Sunshine Coast, Sippy Downs, May 16th Lecture.
- MoNRE, 2003. *Viet Nam Initial National Communication Under the United Nations Framework Convention on Climate Change*. MoNRE, Ha Noi, Viet Nam. <http://unfccc.int/resource/docs/natc/vnmnc01.pdf>
- MoNRE, 2006. *Vietnam's ICZM strategy 2020 and orientation up to 2030*, Final Draft, Hanoi. [www.scribd.com/doc/6609260/ICZM-in-VietnamStrategy-Orientation](http://www.scribd.com/doc/6609260/ICZM-in-VietnamStrategy-Orientation)
- Nelson, R., Kokic, P., Crimp, S., Meinke, H. & Howden, S. M. 2010. The vulnerability of Australian rural communities to climate variability and change: Part I—Conceptualising and measuring vulnerability, *Environmental Science & Policy*, 13(1): 8-17.
- Nelson, R., Kokic, P., Crimp, S., Martin, P., Meinke, H., Howden, S. M., de Voil, P. & Nidumolu, U. 2010. The vulnerability of Australian rural communities to climate variability and change: Part II—Integrating impacts with adaptive capacity, *Environmental Science & Policy*, 13(1): 18-27.
- Nguyen, N. C., Bosch, O. J. H., & Manni, K. E. 2011. 'Creating "Learning Laboratories" for Sustainable Development in Biospheres: A Systems Thinking Approach', *Systems Research and Behavioural Science*, 28, 51-62.

- Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden and C.D. Woodroffe, 2007. *Coastal systems and low-lying areas. Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 315-356.
- Parry, M.L., O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, (eds.) 2007: *Cross-chapter case study*. In: *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK.
- Powell, N., Osbeck, M., Sinh Bach Tan, and Vu Canh Toan. 2011. *World Resources Report Case Study. Mangrove Restoration and Rehabilitation for Climate Change Adaptation in Vietnam*. World Resources Report, Washington DC. Available online at <http://www.worldresourcesreport.org>
- Richards R, Sanó M, Roiko A, Carter RW, Bussey M, Matthews J & Smith TF, 2012, 'Bayesian belief modeling of climate change impacts for informing regional adaptation options', *Environmental Modelling & Software* (in press, published online).
- Roiko, A., Mangoyana, R.B., McFallan, S. Carter, R.W. Oliver, J. & Smith, T.F. 2012, 'Socio-economic trends and climate change adaptation: the case of South East Queensland', *Australasian Journal of Environmental Management*, vol. 19, no. 1, pp. 35-50.
- Slaughter, R. & Bussey, M. 2005. *Futures Thinking for Social Foresight*, Tamkang University Press, Taipei.
- Smith, T. F., Brooke, C., Preston, B., Gorddard, R., Abbs, D., Mcinnes, K. and Withycombe, G. 2007, 'Managing for Climate Variability in the Sydney Region', *Journal of Coastal Research*, SI 50, pp. 109-113.
- Smith, T. F. 2009, 'Beyond Knowledge: A Neo-Research Approach to Climate Change Adaptation', In Martin, J., Rogers, M. and Winter, C. (eds.) *Climate Change Responses across Regional Australia: Social Learning and Adaptation*, VURRN Press, Victoria, pp. 30-44.
- Smith, T. F., Lynam, T., Preston, B. L., Matthews, J., Carter, R. W., Thomsen, D. C., Carter, J., Roiko, A., Simpson, R., Waterman, P., Bussey, M., Keys, N. and Stephenson, C. 2010, 'Towards Enhancing Adaptive Capacity for Climate Change Response in South East Queensland', *The Australasian Journal of Disaster and Trauma Studies*, vol. 2010-1.
- Smith, T.F., Myers, S., Thomsen, D.C. & Rosier, J. 2011, 'Integrated coastal zone management and planning', in Gullett, W., Schofield, C. & Vince, J. (eds), *Marine Resources Management*, Lexis Nexis Butterworths, Sydney, pp. 109 - 21.
- Smith, T.F., Daffara, P., O'Toole, K., Matthews, J.M., Thomsen, D.C., Inayatullah, S., Fien, J. & Graymore, M. 2011, 'A Method for Building Community Resilience to Climate Change in Emerging Coastal Cities', *Futures*, vol. 43, pp. 673-679.
- Soc Trang Statistics Office 2011. Soc Trang Statistical Yearbook 2010, Statistical Publishing House.
- Stewart, M.G. & Wang, X. 2011. *Risk assessment and economic viability of climate adaptation measures for Australian housing subject to extreme wind events*. 19th International Congress on Modelling and Simulation, Perth, Australia, 12–16 December 2011. <http://www.mssanz.org.au/modsim2011/F7/stewart.pdf>
- UN/ISDR (Inter-Agency Secretariat of the International Strategy for Disaster Reduction) (2004). *Living with Risk: A global review of disaster reduction initiatives (Volume II Annexes)*, United Nations, New York and Geneva. [www.unisdr.org/files/657\\_lwr21.pdf](http://www.unisdr.org/files/657_lwr21.pdf)
- Vietnamese Government 2012. Decision No. 423/QĐ-TTg of April 11, 2012, Approving the Master Plan on Socio-economic Development of Soc Trang Province through 2020.
- Walker, J., Pinzone, T., Opkar, J., Bronfentrinker, L., Niles, C., Bowden, D., Shepherd, L., Jones, A., Dye, T. 2010. Beach Sand Nourishment Scoping Study: Maintaining Sydney's Beach Amenity Against Climate Change Sea Level Rise. Report prepared by AECOM Australia Pty Ltd for the

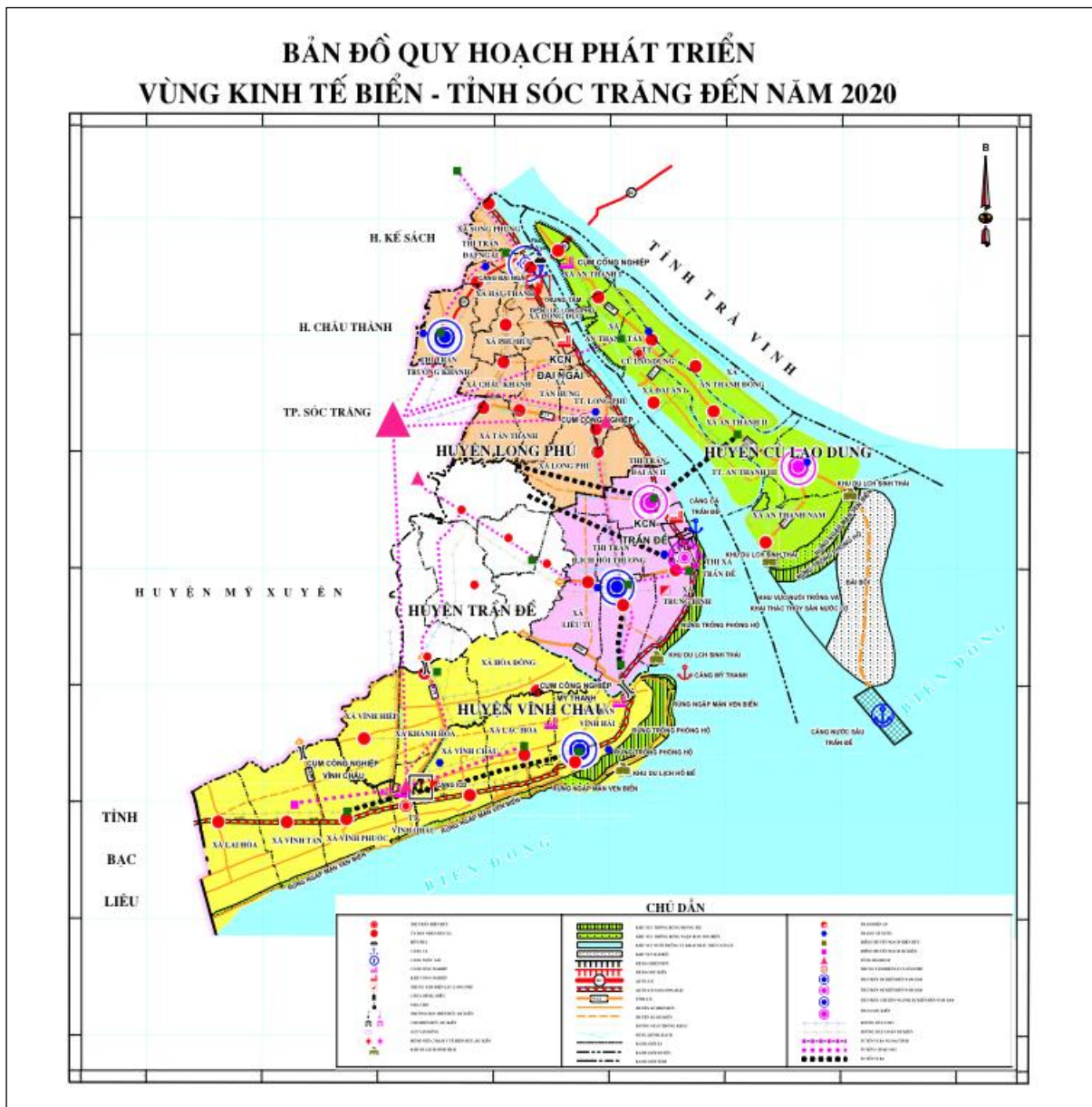
Sydney Coastal Councils Group.

[www.sydneycoastalcouncils.com.au/sites/default/files/beachsandnourishmentscopingstudy.pdf](http://www.sydneycoastalcouncils.com.au/sites/default/files/beachsandnourishmentscopingstudy.pdf)

Yohe, G., and R.S.J. Tol, 2002: Indicators for social and economic coping capacity - moving toward a working definition of adaptive capacity. *Global Environmental Change-Human And Policy Dimensions*, 12(1), pp. 25-40.

## Appendices

### Appendix 1: Example of map used to stimulate systems thinking



## Appendix 2: Key informant interview questions

### Preamble:

Thank you for agreeing to participate in an interview regarding integrated coastal management in Soc Trang province. The purpose of the interview is to gain your perception of the capacity to manage coastal issues. We expect that the interview will last for about 30 to 40 minutes. We would like to record the interview so that we can transcribe and analyse the interview. Your comments will be confidential and your identity will remain anonymous.

### Question 1:

What do you think are the most important coastal management issues for Soc Trang province?

### Question 2:

What do you think are the biggest constraints affecting coastal management in Soc Trang province?

### Question 3:

What do you think are the biggest opportunities for coastal management in Soc Trang province?

### Question 4:

The capacity to manage coastal issues can be broken up into a number of areas. For each area in the table below please rate: (i) your perception of the importance of each area for managing coastal issues; and (ii) your perception of the current capacity to manage coastal issues on a scale of 0 to 5 (where 0 indicates no importance or there is no current capacity in that area, and 5 indicates critical importance or that there is complete capacity in that area).

	Importance of this area for coastal management	Capacity within your organisation or sphere of influence	Capacity within Soc Trang province
	Rating (0 to 5)	Rating (0 to 5)	Rating (0 to 5)
4a. Financial capital (e.g. money)			
4b. Human capital (e.g. people, skills, education)			
4c. Built capital (e.g. infrastructure)			
4d. Natural capital (e.g. natural resources)			
4e. Social capital (e.g. relationships & goodwill between people)			
4f. Organisational capital (e.g. organizational structures and processes)			

### Question 5:

Has the level of capacity in any of these areas changed over the past 10 years, and if so, how?

### Question 6:

Are there any other issues that you think are relevant to integrated coastal management that we have not discussed?

## Appendix 3: Futures triangle results

### ICAM 2025 – Futures triangle results by groups

#### Group 1: Planning Coordination & Environment

##### Question 1: What are the push, pull and weights of the future for ICAM in 2025?

Weight (Past)	Push (Present)	Pull (Future)
<ul style="list-style-type: none"> <li>▪ Low environmental protection awareness</li> <li>▪ Complying with environmental law is low</li> <li>▪ Regulation not appropriate</li> <li>▪ Benefit conflicts among sectors in resource and space using</li> <li>▪ Low in management, development and preservation of natural resources</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reduction in biodiversity and coastal natural resources</li> <li>▪ Declining of coastal water quality</li> <li>▪ Lack of freshwater at the coastal zones</li> <li>▪ Environmental catastrophe/disasters (storms, sea level rise, erosion...)</li> <li>▪ Risk of oil spill</li> </ul>	<ul style="list-style-type: none"> <li>▪ Effective multi-sectoral coordination</li> <li>▪ Appropriate zonation for resource using</li> <li>▪ Effective management of data on coastal resources.</li> </ul>

##### Question 2: Which part of the futures triangle is the most easy or difficult to change?

Results **Most easy** to change/influence: **Push (Present)**

**Most difficult** to change/influence: **Weight (Past)**

##### Question 3: Why do you think so?

Weight (Past)	Push (Present)	Pull (Future)
<ul style="list-style-type: none"> <li>▪ Benefits conflicts because everyone does their things without caring about others</li> <li>▪ Exploitation without plans for protection, regeneration</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wastewater without treatment</li> <li>▪ Destructive exploitation of natural resources</li> </ul>	<ul style="list-style-type: none"> <li>▪ Consensus in regulation mechanism</li> <li>▪ Available master plan on resources use</li> </ul>

## Group 2: Agriculture and Rural Development

**Question 1: What are the push, pull and weights of the future for ICAM in 2025?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Limited funds</li> <li>▪ Spreading investment</li> <li>▪ Small and scattered production</li> <li>▪ Limited public awareness on climate change</li> </ul>	<ul style="list-style-type: none"> <li>▪ Eroded coastline</li> <li>▪ Recovering mangrove forest</li> <li>▪ Polluted water sources</li> <li>▪ Socio-economic developing</li> <li>▪ Expansion of international cooperation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Development of protective forest at the coasts (20%)</li> <li>▪ Upgrading, consolidation of dykes, together with transportation</li> <li>▪ Good management of water resources</li> <li>▪ Stable and development of socio-economics</li> </ul>

**Question 2: Which part of the futures triangle is the most easy or difficult to change?**

Results **Most easy** to change/influence: **Push (Present)**

**Most difficult** to change/influence: **Weight (Past)**

**Question 3: Why do you think so?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Low investment efficiency</li> <li>▪ High risks</li> </ul>	<ul style="list-style-type: none"> <li>▪ Evidences of on-going in reality (effective models for replication)</li> <li>▪ Water resource management and environment are current interests</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhanced public awareness</li> <li>▪ Appropriate planning and policies</li> </ul>



### Group 3: Aquaculture

**Question 1: What are the push, pull and weights of the future for ICAM in 2025?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Single sectoral management</li> <li>▪ Inappropriate policy, financial mechanism</li> <li>▪ Limited community awareness</li> <li>▪ Not interested in biodiversity conservation</li> <li>▪ Small production</li> </ul>	<ul style="list-style-type: none"> <li>▪ Climate change</li> <li>▪ High risk in production</li> <li>▪ Over-exploitation of aquatic resources</li> <li>▪ Insufficient management of coastal environment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Multi-sectoral management and adaptation to climate change management</li> <li>▪ Co-management of forest and in shore fisheries</li> <li>▪ Biodiversity conservation</li> <li>▪ Enhancement of community awareness/educational level/responsibility</li> <li>▪ Stable production, reduced risks, increase income, enhanced lives</li> </ul>

**Question 2: Which part of the futures triangle is the most easy or difficult to change?**

Results **Most easy** to change/influence: **Push (Present)**

**Most difficult** to change/influence: **Weight (Past)**

**Question 3: Why do you think so?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Behaviour of people</li> <li>▪ Low value products, high investment costs</li> </ul>	<ul style="list-style-type: none"> <li>▪ Evidences of changes in weather, natural disasters, storms...</li> <li>▪ Many deaths of shrimps/ livestock; reduction in crop productivity; many diseases</li> </ul>	<ul style="list-style-type: none"> <li>▪ Implementing of ICAM</li> <li>▪ Success of some areas implemented ICAM</li> </ul>

**Group 4: Districts**

**Question 1: What are the push, pull and weights of the future for ICAM in 2025?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Limited public awareness</li> <li>▪ No detail and synchronized planning</li> <li>▪ Limited funds (little investment)</li> <li>▪ Insufficient management in resource use</li> <li>▪ Climate change</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strategy for marine economy has been approved</li> <li>▪ International cooperation/interests (GIZ, World Bank)</li> <li>▪ High potentials in natural resources (fish, sand, forest...)</li> <li>▪ Many works have been invested (sea dykes, protective forest, aquaculture zones, salt production...)</li> <li>▪ Residential area planning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increasing mudflat area</li> <li>▪ Developing mangrove forests</li> <li>▪ Sustainable use of aquatic resources</li> <li>▪ Enhanced public educational level/ awareness</li> <li>▪ Attracting investors</li> <li>▪ Positively developing of marine socio-economy</li> <li>▪ Promoting of coastal urban development</li> </ul>

**Question 2: Which part of the futures triangle is the most easy or difficult to change?**

Results **Most easy** to change/influence: **Push (Present)**

**Most difficult** to change/influence: **Weight (Past)**

**Question 3: Why do you think so?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Subjectively: low community awareness + weak management</li> <li>▪ Objectively: Impacts of climate change</li> </ul>	<ul style="list-style-type: none"> <li>▪ Long coastline, population concentration at the coasts (to mitigate the impacts, to develop, there should be appropriate measures)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Abundance of natural resources</li> <li>▪ Socio-economic development</li> </ul>

**Group 5: Others**

**Question 1: What are the push, pull and weights of the future for ICAM in 2025?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ No synchronized coordination among sectors/levels</li> <li>▪ Backward customs/habits</li> <li>▪ Low developing economics; big gap between rich and poor; dependence on natural resources</li> <li>▪ Limited educational level/public awareness</li> <li>▪ Undeveloped infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Supports from domestic and international organizations</li> <li>▪ Available provincial action plan on socio-economic development</li> <li>▪ Depletion of natural resources and ecological imbalance affecting communities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Completing ICAM</li> <li>▪ Deployment of some adaptive models to climate change, socio-economic development of the province</li> <li>▪ Creating favourable conditions for cooperation and investment</li> </ul>

**Question 2: Which part of the futures triangle is the most easy or difficult to change?**

Results **Most easy** to change/influence: **Pull (Future)**

**Most difficult** to change/influence: **Weight (Past)**

**Question 3: Why do you think so?**

<b>Weight (Past)</b>	<b>Push (Present)</b>	<b>Pull (Future)</b>
<ul style="list-style-type: none"> <li>▪ Because public educational level is foundation for social development</li> <li>▪ Backward customs/habits are burdens because they are difficult to change in a short time</li> </ul>	<ul style="list-style-type: none"> <li>▪ Step by step quality of life enhanced</li> <li>▪ Measures for natural resource protection and ecosystem balancing are needed</li> </ul>	<ul style="list-style-type: none"> <li>▪ Completing ICAM is a pull because it arises from reality/practical demand in socio-economic development with ICAM's sustainable efficiency</li> <li>▪ In order to mobilize community participation in provincial adaptation to climate change and socio-economic development</li> </ul>

## Appendix 4: Scenarios

### ICAM 2025 - FUTURE SCENARIOS

#### Group 1: Planning Coordination & Environment

Preferred Scenario	Collapse Scenario
<i>Integrated management and zonation of the coastal zones</i>	<i>No one cares about the others; exploitation without protection</i>
<ul style="list-style-type: none"> <li>▪ <i>Society</i>: enhanced community awareness on environmental protection</li> <li>▪ <i>Technology</i>: application of cleaner production</li> <li>▪ <i>Environment</i>: improved environmental quality</li> <li>▪ <i>Economy</i>: increased income</li> <li>▪ <i>Politics</i>: creating trust for enterprises and people</li> <li>▪ <i>Values</i>: creating connectedness of communities</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Society</i>: unstable, social vices</li> <li>▪ <i>Technology</i>: no application of advanced technology</li> <li>▪ <i>Environment</i>: increasing pollution</li> <li>▪ <i>Economy</i>: unstable income</li> <li>▪ <i>Politics</i>: distrust in government</li> <li>▪ <i>Values</i>: emergence of individualism</li> </ul>
<p style="text-align: center;"><u><i>2 main actions to realize the preferred scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Creating consistent mechanisms, regulations</li> <li>▪ Making master plan for natural resources use</li> </ul>	<p style="text-align: center;"><u><i>2 main actions to prevent the collapse scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Ensuring benefit harmony among stakeholders</li> <li>▪ Effective management, protection and development of resources</li> </ul>
<p style="text-align: center;"><u><i>2 most desired things in the preferred scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Integrated management</li> <li>▪ Zonation of the coastal zones</li> </ul>	<p style="text-align: center;"><u><i>2 most feared things in the collapse scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ No one cares about the others</li> <li>▪ Exploitation without protection</li> </ul>

**Group 2: Agriculture and Rural Development**

<p style="text-align: center;"><u>Preferred Scenario</u> <i>Soc Trang vision of 2025</i></p>	<p style="text-align: center;"><u>Collapse Scenario</u></p>
<ul style="list-style-type: none"> <li>▪</li> <li>▪ <i>Society</i>: stable and developed (public educational level increased, income increased...)</li> <li>▪ <i>Technology</i>: application of new and advanced technologies</li> <li>▪ <i>Environment</i>: sustainable, green, clean, beautiful (development of protective coastal forest, well management of water resources)</li> <li>▪ <i>Economy</i>: sustainable development</li> <li>▪ <i>Politics</i>: stable, democracy (public participation, people's voice heard)</li> </ul>	<p style="text-align: center;"><b>The collapse scenario is the CONTRAST scenario of the preferred scenario.</b></p>
<p style="text-align: center;"><u>2 main actions to realize the preferred scenario</u></p> <ul style="list-style-type: none"> <li>▪ Well implementation of planning and management</li> <li>▪ Well implementation of ICAM</li> </ul>	<p style="text-align: center;"><u>2 main actions to prevent the collapse scenario</u></p>
<p style="text-align: center;"><u>2 most desired things in the preferred scenario</u></p> <ul style="list-style-type: none"> <li>▪ <i>Society</i>: stable and developed (public educational level increased, income increased...)</li> <li>▪ <i>Economy</i>: sustainable development</li> </ul>	<p style="text-align: center;"><u>2 most feared things in the collapse scenario</u></p> <ul style="list-style-type: none"> <li>▪ Society</li> <li>▪ Environment</li> </ul>

### Group 3: Aquaculture

Preferred Scenario	Collapse Scenario
<ul style="list-style-type: none"> <li>▪ <i>Society</i>: public educational level and living standard increased</li> <li>▪ <i>Technology</i>: application of cleaner production, biotechnology</li> <li>▪ <i>Environment</i>: mangrove forest, aquatic resource are protected</li> <li>▪ <i>Economy</i>: development together with environmental protection</li> <li>▪ <i>Politics</i>: stable, no conflicts/disputes</li> <li>▪ <i>Values</i>: many options available, access to education, health care, information</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Society</i>: no consensus of people, no new job generation for coastal community</li> <li>▪ <i>Technology</i>: not ensured conditions for adaptation to climate change and natural disaster</li> <li>▪ <i>Environment</i>: destroyed mangrove forest, depleted aquatic resource</li> <li>▪ <i>Economy</i>: Low living standard</li> </ul>
<p style="text-align: center;"><u><i>2 main actions to realize the preferred scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Implementing ICAM</li> <li>▪ Development of infrastructure, PES (payment for ecosystem services)</li> </ul>	<p style="text-align: center;"><u><i>2 main actions to prevent the collapse scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Co-management + ICAM</li> <li>▪ Investment in infrastructure</li> </ul>
<p style="text-align: center;"><u><i>2 most desired things in the preferred scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ <i>Society</i>: Public educational level and living standard increased</li> <li>▪ <i>Environment</i>: mangrove forest, aquatic resource are protected</li> </ul>	<p style="text-align: center;"><u><i>2 most feared things in the collapse scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ No consensus of people</li> <li>▪ Not ensured conditions for adaptation to climate change and natural disaster</li> </ul>

**Group 4: Districts**

Preferred Scenario	Collapse Scenario
<ul style="list-style-type: none"> <li>▪ <i>Society</i>: civilization + progression</li> <li>▪ <i>Technology</i>: advanced</li> <li>▪ <i>Environment</i>: clean, limitation of industrial wastes, development of protective forest</li> <li>▪ <i>Economy</i>: developed</li> <li>▪ <i>Politics</i>: stable</li> <li>▪ <i>Values</i>: life is gradually enhanced</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Society</i>: backward + inequality</li> <li>▪ <i>Technology</i>: no approach to new technology</li> <li>▪ <i>Environment</i>: seriously polluted</li> <li>▪ <i>Economy</i>: Natural disasters + diseases</li> <li>▪ <i>Politics</i>: not good social welfare policy; class conflict</li> <li>▪ <i>Values</i>: increasing poverty + hunger</li> </ul>
<p style="text-align: center;"><u><i>2 main actions to realize the preferred scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Completing the institutional system</li> <li>▪ Increasing in cooperation for investment</li> </ul>	<p style="text-align: center;"><u><i>2 main actions to prevent the collapse scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Public educational level/awareness raising</li> <li>▪ Increasing in adaptation to climate change measures</li> </ul>
<p style="text-align: center;"><u><i>2 most desired things in the preferred scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ <i>Technology</i>: advanced</li> <li>▪ <i>Values</i>: life is gradually enhanced</li> </ul>	<p style="text-align: center;"><u><i>2 most feared things in the collapse scenario</i></u></p> <ul style="list-style-type: none"> <li>▪ Natural disasters + diseases</li> <li>▪ Increasing poverty + hunger</li> </ul>

**Group 5: Others**

Preferred Scenario <b>Soc Trang Paradise 2025</b>	Collapse Scenario <b>Shattered dream</b>
<ul style="list-style-type: none"> <li>▪ <i>Society</i>: equality, civilization</li> <li>▪ <i>Technology</i>: progressive, modern</li> <li>▪ <i>Environment</i>: clean, green, beautiful</li> <li>▪ <i>Economy</i>: sustainable development</li> <li>▪ <i>Politics</i>: stable</li> <li>▪ <i>Values</i>: increased quality of life</li> </ul>	<ul style="list-style-type: none"> <li>▪ <i>Society</i>: divided between rich and poor</li> <li>▪ <i>Technology</i>: low development</li> <li>▪ <i>Environment</i>: pollution</li> <li>▪ <i>Economy</i>: crisis, depression</li> <li>▪ <i>Politics</i>: unstable</li> <li>▪ <i>Values</i>: increasing poverty + hunger, jobless, and social vices</li> </ul>
<p style="text-align: center;"><u>2 main actions to realize the preferred scenario</u></p> <ul style="list-style-type: none"> <li>▪ Effective deployment of policies, institutions</li> <li>▪ Enhancing of education/training quality and efficiency</li> </ul>	<p style="text-align: center;"><u>2 main actions to prevent the collapse scenario</u></p> <ul style="list-style-type: none"> <li>▪ Enhancing public awareness on law abiding; strict in law enforcement</li> <li>▪ Implementation of ICAM in communities</li> </ul>
<p style="text-align: center;"><u>2 most desired things in the preferred scenario</u></p> <ul style="list-style-type: none"> <li>▪ <i>Society</i>: equality, civilization</li> <li>▪ <i>Environment</i>: clean, green, beautiful</li> </ul>	<p style="text-align: center;"><u>2 most feared things in the collapse scenario</u></p> <ul style="list-style-type: none"> <li>▪ <i>Society</i>: divided between rich and poor</li> <li>▪ <i>Environment</i>: pollution</li> </ul>

*The two most desired things in the preferred scenarios selected by the futures workshop participants from each of the 5 working group were collected and synthesised into the integrated scenario.*

**Soc Trang ICAM 2025 Integrated Scenario**

- Integrated management
- Zonation of the coastal zones
- Stable and developed society (public educational level increased, income increased...)
- Sustainable development
- Public educational level and living standard increased
- Mangrove forest, aquatic resource are protected
- Advanced technology
- Life is gradually enhanced
- Equality, civilization
- Clean, green, beautiful environment



## Appendix 5: Visions

*The vision cards were based on the preferred scenario selected by the groups and included the elements of the integrated scenario. These vision cards can be edited into collective vision statement.*

### VISION CARDS Results

- Bridge to connect Cù Lao Dung with the mainland and other coastal provinces
- Coastal urban area
- Harbour
- Green protection forest combines with eco-tourism
- A better understanding of ICAM
- Life of people to be improved
- Development of wind energy
- A better environment
- Many mangrove forests
- Many conservation areas
- Development of eco-tourism
- The result of a massive effort to exchange information, collaborative support to protect and restore environmental values, AND, a process of cross-sectoral and community-involved, government
- Improvement of people's life
- Protection forest to be expanded; green and clean environment
- Everyone benefits from the clean and beautiful coastal biotope
- Clean environment
- Green landscape
- Prosperous urban area
- Harmonious and sustainable development of society, people and nature
- I can see many robots working on farms and rice-fields
- Mangroves, dyke, sustainable aquaculture save villages
- Intact mangrove belt protecting the land behind
- High urbanisation pace co-ordinates with appropriate and sustainable environmental protection
- Life of community improves in terms of quality and quantity
- Economic development
- Modern technologies
- Mangrove forests increase much
- Sóc Trăng 2025: Clean streets, spacious houses, beautiful beaches and green coastal forest
- Mangrove forest is the shield protecting the coast and peaceful life of people

- Living standard improves
- Beautiful sea
- Forest restores
- A better society with green and clean environment
- **-Economic development**
- Clean environment
- Beautiful and modern Sóc Trăng
- A green coastal city
- A wonderful picture of peacefulness and development; clean environment; everyone lives responsibly and beautiful nature
- Prosperous community, clean environment, forest is protected, biodiversity, comfortable life, strong community links
- Wonderful! Clean environment, modern technologies
- Clean and nice roads
- Coastal protection forest expands and develops well
- Abundant fishery resources
- Sustainable economic development
- Social justice and civilization
- **Life improves day by day**
- Clean environment
- Immense and green mangrove forest
- Life of people develops
- Vision of Sóc Trăng 2025: clean and sustainable
- Awareness and life of people enhance
- Advanced technologies
- Clean and green environment
- Clean beach
- Mangrove forest
- Sustainable use of the mangrove and an improved livelihood
- Forest coverage increases
- Wind energy
- Immense mangrove forest
- **2025 Happiness**
- Economic development, social stability, clean and green environment

## Appendix 6: Back Casting Card Results

2025	<ul style="list-style-type: none"> <li>▪ Social equality + civilization</li> <li>▪ Enhanced life of communities, ensured quality of life in all aspects</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Sustainable economic development</li> <li>▪ Adaptation to climate change</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Enlisting investment funds as planned</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Planning</li> <li>▪ Organizing for step by step implementation of the plan</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ New forest planting</li> <li>▪ Good development</li> <li>▪ Community acts together</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ New forest planting and good protection</li> <li>▪ Communication for community to understand and to orient future, construction of facilities</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Action planning</li> <li>▪ Communication for public awareness raising</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Public educational level and living standard enhanced</li> <li>▪ Advanced technology</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Building and deploying ICAM models effectively and widely in communities</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Completing effectively ICAM models</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Planning; communication for public awareness raising</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Management model (co-management) replicated national wide</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Workshop for lesson learned from implementation</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Building integrated/unified management institution</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Vision</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Mangrove forest area more and more expanded</li> <li>▪ Biodiversity</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Forest plantation and protection</li> <li>▪ Reasonable exploitation of aquatic resources</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Planning, public awareness raising</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Keeping effective values and consideration of next changes</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Continuing consider and consolidate policies, legal base for more appropriate</li> <li>▪ Consideration of plans for timely adjustments</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Good implementation of plans</li> <li>▪ More consolidation and development of policies, legal bases</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Building synchronized infrastructure</li> <li>▪ Master planning and detail planning for coastal management, policies, law</li> <li>▪ Planning for public awareness raising</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Comprehensive development in economy – culture – society</li> <li>▪ Maintaining good national defence, stable politics and safe society</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Progression in industrialization, modernization</li> <li>▪ Promoting community awareness in socio-cultural-economic development and environmental protection</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Effective implementation of institutions, policies, laws and ICAM models</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Effective implementation of education, public awareness raising, projects</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Vision</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Integration of multi-sectors</li> <li>▪ ICAM</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Enhancement of public educational level/awareness</li> <li>▪ Building infrastructure for the coastal zones</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ No deforestation</li> <li>▪ No depletion of natural resources</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Many robots working on farms and rice-fields</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Test of overall operation of the hi-tech industry supporting for working robots</li> <li>▪ Choose graduated students</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Strengthening automatic industry locally</li> <li>▪ Import new technology in automatics</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Choose best students of automatic and software operation to send abroad for study</li> </ul>

2025	▪ Vision
2020	▪ Sustainable development
2015	▪ Enhancement of quality of education
2012	▪ Master planning, economic development, increasing in investment

2025	▪ Sustainable development for production
2020	▪ All industrial zones are green parks
2015	▪ Planning and rezoning industrial zones
2012	▪ Reduce pollution (air, soil, especially water)

2012	▪ Commit to ICAM and support its implementation
	▪ Increase community awareness of environmental values (link to their future)
2015	▪ Review above, adapt strategies as required; implement
2020	▪ As for 2015, but if process is failing, urgent seek a replacement process!

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|  | ▪ Having strategy for forest plantation and protection  |
|  | ▪ Increasing in environmental protection (collection and treatment of wastes with standard procedure) |
|  | ▪ Having agreement among sectors to protect environment   |

2020	▪ Filtering, selecting of effective activities
	▪ Continuing of effective activities
2015	▪ Deploying of plan implementation
	▪ Checking and evaluating of the implementation
2012	▪ Building plan
	▪ Preparation of good conditions for implementation of plan

2020	▪ Evaluation of the planning implementation
2015	▪ Deploying of the planning, complementing and completing the planning
2012	▪ Planning to 2025

2020	<ul style="list-style-type: none"> <li>▪ Deploying extensively advanced technologies, standard procedures, reduction of risks in production</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Deploying of the plan, public awareness raising, education, communication</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Strategy planning, collecting information, data for ICAM</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Evaluation</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Monitoring</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Initiation</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Vision</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Revaluating ICAM</li> <li>▪ Integrating ICAM plan into socio-economic development planning</li> <li>▪ Deploying of the next cycle</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Deploying of ICAM</li> <li>▪ Public awareness raising on ICAM</li> <li>▪ Defining state of the coast (SOC)</li> <li>▪ Considering, complementing, consolidating ICAM</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Collecting information, data</li> <li>▪ Consulting stakeholders</li> <li>▪ Building ICAM plan</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ People, government and scientists all agree in application of environmental friendly techniques</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Improvement of people's livelihoods</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Mangrove forest rehabilitation</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Time was sought efficient</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Best-fit solutions to scarce financial resources</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Link "realistic Plans" to Budgets</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ "Buy time"</li> </ul>

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| 2025 | ▪ Green management                         |
| 2020 | ▪ Sustainable management system for forest |
| 2015 | ▪ Monitoring of forest plantation          |
| 2012 | ▪ Planning for forest plantation           |

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|------|-------------------------------|
| 2025 | ▪ Reaching                    |
| 2020 | ▪ Do things which are better  |
| 2015 | ▪ Do things which are correct |
| 2012 | ▪ Planning                    |

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|------|---|
| 2025 | ▪ Sustain & prepare new visions   |
| 2020 | ▪ Finish dyke (modern design)   |
| 2015 | ▪ Finish mangrove rehabilitation, break walls and enhance sustainable aquaculture |
| 2012 | ▪ Make vision and action plan operational   |

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|------|---|
| 2020 | ▪ Completing coastal infrastructure         |
| 2015 | ▪ Building dyke for salinization prevention |
| 2012 | ▪ Public awareness raising on ICAM          |

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| 2020 | ▪ Building forest ecotourism zone  |
| 2015 | ▪ Implementation of project  |
| 2012 | ▪ Hiring consultants for project planning.<br>▪ Building bridge over the Hau river |

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| 2025 | ▪ Evaluation, conclusion of what would be achieved/not achieved                          |
| 2020 | ▪ Monitoring of the implementation process, adjusting, complementing and completing plan |
| 2015 | ▪ Implementation of desired goals  |
| 2012 | ▪ Planning for future  |

2020	<ul style="list-style-type: none"> <li>▪ Deploying of forest plantation planning</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Forest plantation planning to 2020</li> <li>▪ Replicating of the co-management models</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Communication for public awareness on forest protection</li> <li>▪ Implementation of forest co-management</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Continue implementing land-use planning and manage forest sustainably</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Adapt land-use planning → allocate more land to protection zone + implement</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Expend knowledge on ICAM + land use planning → distribution of the idea</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Stop the development cooperation, because they can manage the work on their own</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Expand co-management to other districts</li> <li>▪ Assist the government + the community in upcoming problems and to improve work</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Establishing ICAM and co-management in the province</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Continuing to implementing and completing ICAM</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Implementation of ICAM, enhancement of management capacity</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Building institutions and awareness raising for ICAM</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Vision</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Evaluation, lesson learning from ICAM</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ First conclusion of the strategy</li> <li>▪ Complementing more activities</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Building detail strategy on ICAM and effectively implementing ICAM for community</li> </ul>

2025	<ul style="list-style-type: none"> <li>▪ Stable development</li> </ul>
2020	<ul style="list-style-type: none"> <li>▪ Hardening sea dyke</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Upgrading sea dykes</li> <li>▪ Planting protective forest</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Planning of the coastal zones</li> </ul>




2020	<ul style="list-style-type: none"> <li>▪ Conclusion for the period of 2012-2020</li> <li>▪ Planning for the period of 2020 - 2025</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Conclusion of the implementation of the period 2012-2015</li> <li>▪ Planning for the period of 2016-2020</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Implementation of ICAM</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Maintenance and development of socio-economy, environment, public awareness</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Public educational level enhancement, economic development, environmental protection, forest plantation</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Planning with detail plans</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Building details indicators to effectively protect and use of the coastal zone and cooperation in implementation</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Focusing on awareness raising, enhancement of IACM capacity on protection and effectively use of the coastal zone</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Mobilization of public participation in ICAM</li> </ul>

2020	<ul style="list-style-type: none"> <li>▪ Forest plantation + management (protection) + education for sustainability</li> </ul>
2015	<ul style="list-style-type: none"> <li>▪ Forest plantation + management (protection) + education for sustainability</li> </ul>
2012	<ul style="list-style-type: none"> <li>▪ Forest plantation + management (protection) + education for sustainability</li> </ul>



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