

## **Understanding TIDE**

### Mission

The TIDE project shall improve the management of tidally-influenced estuaries, which serve as major shipping routes, by developing concrete "tools" which enable stakeholders to take the whole estuary system, with all three dimensions of sustainability (ecology, economy & society), into account.

# **Overriding Principles of TIDE Approach (and thus integral part of all activities)**

## **Ecosystem Service Approach**

All TIDE work is based on the ecosystem service approach. This means that all studies explore the underlying relations between the ecosystem functions of estuaries, the resulting ecosystem services and the societal benefits derived from those. On the basis of this knowledge we hope to better understand the way in which the variety of human interventions affect these interrelations.



Figure 1. Ecosystem service approach

#### **Integration**

Every assessment within TIDE is based on all three sustainability dimensions and understands the whole estuary as one single system.



Figure 2: TIDE at intersection of the three pillars of sustainability







The integrated approach is mainly reflected within the TIDE partnership itself, which brings together partners from ports, environmental organisations, as well as researchers. In addition, each estuary will work with a regional working group (RWG) composed of an open-minded, diverse group of experts representing different stakeholders. Within these RWGs the estuary partners can discuss important TIDE interim results and thus ensure a broad spectrum of perspectives.

## **Transnational**

TIDE departs from estuary-specific, singular assessments and studies, instead seeking a better understanding of tidally-influenced estuaries by looking at the same topics and issues in four (in some cases more) estuaries and possibly finding common conclusions. In that sense, TIDE is not merely about the exchange of experience, but also seeks to extract more reliable knowledge. For this purpose, transnational working groups (TWG) are set up for each topic/issue within TIDE.



Figure 3. Transnational cooperation of the TIDE actors









Figure 4. Workflow for the activities of each TIDE Transnational Working Group (TWG)







## **Best Methods**

All working groups will, at the beginning of each task, screen methods available within and outside their estuaries, as well as from former and parallel projects and jointly agree on the "best method" to be used for analysis within TIDE. The results of this screening process will be included in the various topical reports to be produced and might also deliver input for the toolbox.

## The sequence and interlinkage between TIDE activities

## **Questions and Hypotheses**

All estuaries have sought to understand and define the functionality lines between their ecosystem characteristics, the resulting ecosystem services, societal benefits derived from them, and the necessary management to ensure the functions of the system. The transnational working group (TWG) is currently bringing those different suggestions together in order to arrive to a commonly agreed TIDE picture of interrelations. These shall serve as the underlying basis for all future TIDE studies.

On the basis of the first set of assessments of ecosystem functions, all estuaries have brought together their most urgent questions related to a better understanding of their estuary system. In most cases, these questions do not only relate to the ecosystem functions. They also address the quantification of the functions and related services in order to provide a benefit (e.g. the required amount of mudflat and shallow water areas for a certain oxygen production). These questions and hypotheses have already been collated to serve as a basis for the future work of the various TWGs.

## **Transnational Background Information**

Through the formation of multiple TWGs and following the process outline in the above schematic, all estuaries are currently actively seeking and exchanging information around the following specific estuary issues:

#### Historical development of estuaries

The variety of human interventions is set against the changes in tidal characteristics, morphological development and evolution of habitats.

#### **Inventory of Governance**

What are the legislative drivers in each estuary? Which management bodies are in place? What type of stakeholders play which roles? What are the strengths/weaknesses and opportunities/threats (SWOT) of these management plans/systems?

#### Inventory of transferable best-practice methods in use at estuaries

• Environmental Impact Assessment Approaches: Identification and documentation of a selected set of major interventions within each estuary for which environmental impact assessment studies were carried out and analysis of how they dealt with uncertainty.





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- Model for calculating ecological carrying capacity
- Hydrodynamic numerical model
- Environmental Integrative Indicators
- Monitoring Schemes: What lessons can be learned from existing monitoring schemes?

#### **Zonation Schemes**

Which zonation scheme is used within each estuary? Is it possible to define zones in such way as to allow their use for inter-estuarine comparisons?

#### **Ecological functions**

Four processes have currently been chosen as a suitable basis for interestuarine comparison:

- 1. Organic matter input and production
- 2. Oxygen balance
- 3. Nutrient Cycling
- 4. Resources for birds and fishes

#### Geomorphological and hydrodynamic functions

- Analysis of sediment transport and sand balance.
- Analysis of water levels, current velocities and salinity.

## Interaction between geomorphological, hydrodynamic and ecological functions

#### Analysis of human interventions

- Agreement on classification of various types of human interventions (e.g. mitigation and compensation measures to achieve various targets).
- Identification and selection of samples from each estuary.
- Collection and comparative analysis of detailed information about the measures on the basis of a jointly agreed set of criteria.
- Collection and comparison of various dredging and sediment relocation strategies at each estuary.

#### **Inventory of Uses / Conflict Matrix**

Which uses are dominant in which zones of each estuary? What conflicts arise between them in these zones or across zones? Can they be related to any of the ecosystem services and societal benefits defined?

#### **Communication Schemes**

How are challenges and opportunities of estuary management communicated to the general public? Interrogation of the public on their perception of the estuary.

#### **Status**

#### Hamburg Meeting / January 2011

Estuaries are still in the process of checking what kind of data and information is generally available. On the basis of this knowledge, all TWG coordinators will work together with their TWG members and agree on what kind of





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available information is really necessary to gather in detail in order to seek solution paths for some of the important questions and hypotheses. Furthermore, the meeting shall be used to align the focus questions and hypotheses of each TWG with those of the other TWGs in order to maintain the integrated TIDE view.

Rouen Meeting / June 2011

On the basis of the agreed set of information gathered, the coordinators with the input of their TWG members shall develop the analytical approach, which shall be presented – in some instance already with some first interim sets of results - by the partners during the meeting in Rouen / France in June 2011

#### **Estuary-Specific Pilot Initiatives**

In addition to the truly transnational initiatives of the working groups, each estuary is also pursuing some estuary specific pilot studies concerning topics such as:

- Sediment management
- Ecological management
- Design of a new communication strategy towards the general public

Even though each of these pilot initiatives has a specific purpose at one estuary, it is anticipated that the background information and analyses generated by these pilot studies shall also provide case specific input to the reports to be prepared by the various TWGs (e.g. report on dredging and sediment relocation strategies, report on the relationship between

ecological/geomorphological/hydrodynamical ecosystem functions and resulting services, as well as governance methods.)

### **Cross-Sectoral Analyses**

Bringing together the interim results of the various inter-estuarine analyses, mechanisms for cross-sectoral or whole system analysis have to be developed based on the ecosystem service approach.

#### **Status**

Hamburg Meeting / January 2011

The Hamburg meeting shall be used as to discuss with all partners on how to approach such cross-sectoral analyses (i.e. can partners jointly undertake this analysis together or shall some external assistance be jointly contracted?). The meeting will consider how this shall be realised in practice.







#### **Estuary Specific Implementation and Communication**

The TIDE project cannot deliver "real" implementation of integrated estuary management plans or measures, but it can – even during the course of the project lifetime – work on putting the newest knowledge into practice:

TIDE estuary managers already put into practice improvements through their use of the best applicable analytical methods to assess the estuary in general, as well as for specific human interventions already planned during the project, and to communicate and plan with their stakeholders.

## **TIDE Outputs / Deliverables**

## **TIDE Reports**

As a result of the variety of TIDE activities mentioned above, the project shall be able to deliver a set of reports showing its conclusions and recommendations:

- Which research methods (both estuary-specific, as well as based on interestuarine comparisons) have shown useful results and should be further developed and applied in the future in order to gain further understanding on estuary functioning?
- What kind of new understanding on estuary functioning has TIDE gained?
- What elements of this new understanding can also be potentially useful for other estuaries?
- What type of methods has TIDE developed to assess human interventions?
- What type of recommendations can TIDE provide to its own as well as other estuaries when developing new human interventions?
- TIDE recommendations towards other estuaries, as well as EU level, for applying system-oriented integrated governance methods

It is anticipated that such guidance will be provided in a variety of forms, e.g. specific reports for specialists, as well as easy-to-read summary versions for general stakeholders. Furthermore, the TIDE reports will provide suggestions for future EU planning processes and integrated estuary management.

## **Estuary-Specific TIDE Results**

In addition to the generic conclusions, TIDE shall result in a concrete set of estuary specific "roadmaps" for the future, which give clear guidance on integrated estuary management for the Elbe, Humber, Scheldt and Weser. These estuary-specific reports shall provide concrete results:

- Based on the various analyses undertaken on estuary functioning (e.g. carrying capacities, additional sites needed, problematic/conflict zones and potential solutions, etc.)
- Based on pre-studies for pilot initiatives (e.g. sites, dredging strategies, relocation strategies, creation of sand bars, etc)





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Furthermore, they shall provide recommendations for future actions related to the continuous realisation of an integrated estuary management approach, i.e.:

- What monitoring schemes are to be used?
- Which type of analytical methods should continue to be used within the estuary?
- What type of additional research is needed in the future?
- In which way can governance be improved in the given estuary?
- How to assess and design human interventions in the future?
- What type of communication methods can be applied?

## **TIDE Toolbox**

As emphasised in the project application, TIDE shall not only produce reports but also a "toolbox", which provides clear guidance to estuary managers and scientists on what kind of "tools" are available to address specific questions.

The "tools" to be presented will equally derive from the TIDE project work, but are a different way of presenting the results, with readers being able to quickly scan for specific guidance and available tools in order to develop solutions to specific questions.

In contrary to comprehensive analytical reports, which require reading from beginning to end, such a toolbox presents available methods (e.g. for developing and analysing data, monitoring schemes, ways for zoning, types of stakeholder involvement, how to do EIAs), as well as available types of soft and hard measures. We aim that the "toolbox" shall present an overall picture of methods and measures available for estuary managers and as such will not only include those developed during the TIDE project, but also those which have proven useful in daily work in these estuaries.

#### **Status**

#### Hamburg Meeting / January 2011

As it is important for project partners to start documenting their work and collecting tools used and developed throughout, the toolbox (target groups, content structure, partner contributions, ways of presenting the information) shall be thoroughly discussed during the partner meeting in Hamburg.









- Yellow boxes refer to general processes taking place in the ecological, economical and societal realms of an estuary and the arrows point to the inter-relations between them.

- White boxes refer to the activities to be conducted by the TIDE project in the framework of these various processes.

Figure 5. Inter-relations between various general estuary processes, TIDE activities within this framework and expected outputs in the realms of ecology, economy and society.







## **Annex: Complimentary Information**

The following overview (Mike Elliott, IECS) provides an additional perspective on the TIDE project, including linkages between the activities and the different work packages:

#### *In a nutshell*: TIDE leading to integrated management:

Needing an understanding of: Ecological structure and functioning (WP3) Leading to describing: Ecosystem services (WP3) Leading to providing: Societal benefits (WP3) Defined by: Historical evolution and estuarine comparisons (WP3) To show how: Ecosystem services are delivered (WP3) Requiring: Management initiatives and governance to ensure how societal benefits are obtained (WP4) Within a multiuser system: What occurs where amongst estuarine users (WP4) Leading to: Conflicts amongst users (WP4) Requiring: Resolution of conflicts (WP4) Requiring: Management measures (WP5) Communicated by: Dissemination and information (WP2)



