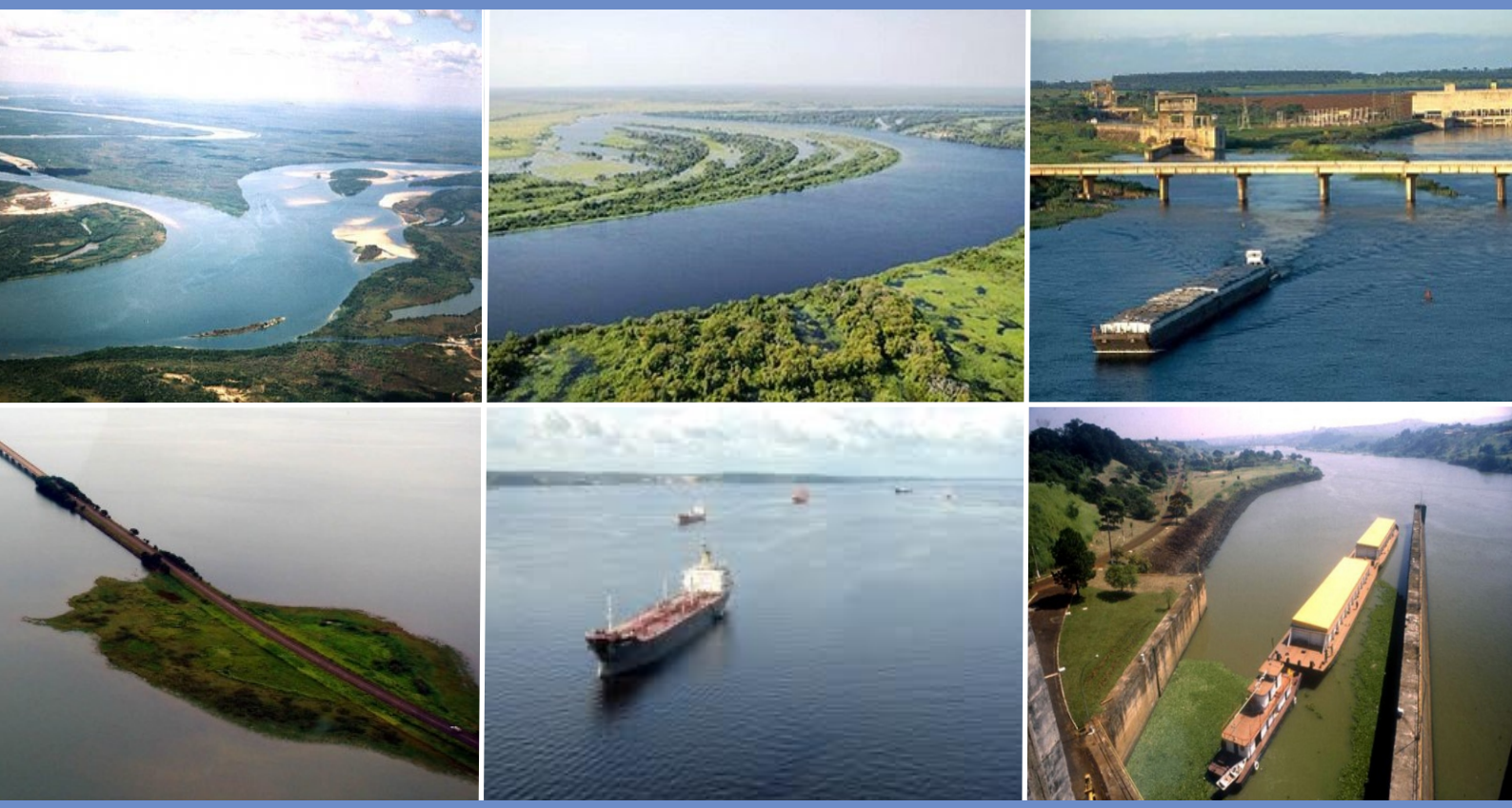
Ministério dos Transportes

PHE

Plano Hidroviário Estratégico

Inland Waterways Strategic Plan



Produto 1 - Relatório do Plano de Trabalho

Product 1 - Workplan Report

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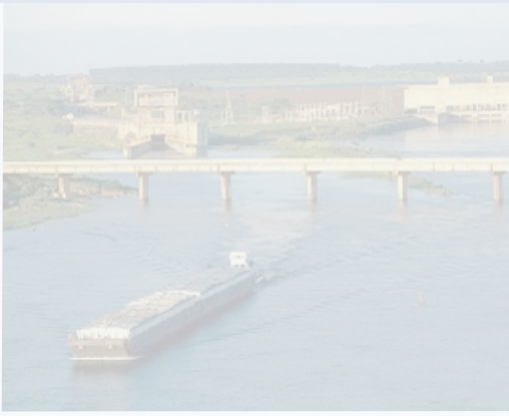


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1 INTRODUCTION

1.1 HISTORY

Brazil has a long system of rivers and lakes. The total length of the system is 63 thousand km. The country is divided into 12 river basins, in which there are 42 thousand km of potentially navigable rivers. Currently, this water system is still underused: only 20 thousand km are economically used for inland transport (ANTAQ 2012). Hereby, the potential of waterways is poorly reflected in the current modal split of cargo transport in the country: 52% road, 30% rail, 8% coastal maritime transport, 5% inland waterway transport and the remaining 5% divided into pipelines (PNLT, 2011).

In this work plan there is a distinction between navigable rivers and waterways. We consider navigable rivers as rivers that are navigable, mainly during flood periods and under conditions that may not necessarily meet safety and reliability requirements for (large scale) inland transport. For navigable rivers to become waterways, investments have to be made. We consider rivers waterways if they are navigable throughout the year (reliability) and convoys or self-propelled vessels with large capacity can navigate safely on them. These terms need to be discussed with the Ministry during the development of the study.

Sustainability (impact on flora and fauna and CO2 emissions, for instance), cost advantages for the sector and security are generally considered to be the major advantages of water transport compared to road transport. The government has already invested heavily in infrastructure development (Programa de Aceleração do Crescimento - PAC/Program for the Acceleration of Growth). For instance, 965.5 million reais were invested in the construction of locks for the Tucuruí complex (dam in Northern Brazil). In addition, there is long standing cooperation with other countries, for instance with Holland and Belgium, to share knowledge.

The goal of the Ministry of Transportation is to increase the share of water transportation in the modal split from the current 13% to 29%. This goal needs to be confirmed or adjusted.

1.2 AIM AND RESULT OF THE PHE PROJECT

To further enhance the transport of cargo and passengers over water with a structural, efficient and solid plan, the MT recently started a project named PHE (Plano Hidroviário Estratégico). With the PHE, the MT wants to prepare a strategy for implementation of the plan until 2031. This strategic plan will be used by the ministry to communicate with stakeholders and other government officials involved in Inland Waterway Transport (IWT). The plan needs to focus on the activities on IWT of the MT and others, in order to integrate MT waterway policies with those of other sectors concerning the use of water resources.

The strategic plan will be prepared by the Consortium ARCADIS LOGOS through a joint effort with the Transport Planning team of the Ministry of Transportation. The World Bank is co-funding the project. The plan will be prepared by an international team in less than 300 days. This will require a great effort in project management and very intense and open communication within the team and between the Ministry of Transportation and ARCADIS LOGOS.

The result of this project will be a strategic plan containing:

- Development goals on the focus areas;
- A short, medium and long term action plan;
  - Interventions in infrastructure
  - Governmental/organizational/legal interventions.
- A plan for communicating the PHE to stakeholders;
- A database.

1.3 SPECIFIC QUESTIONS

Specific questions that the Ministry of Transportation raised in the Terms of Reference will be addressed in the project. The most important general questions considered in the end reports are:

❖ **Stakeholders:**

- What is the opinion of relevant stakeholders on current and future inland waterway transportation?
- What are their demands?
- What opportunities for improvement do they see?
- Under what conditions can they be partners in strengthening IWT?

❖ **Assessment and Diagnosis**

- What are the strengths and weaknesses of the current situation as a starting point?
- What opportunities and threats may the future bring for IWT?
- What relevant information and data can you provide, in order to track the development of IWT as the MT is implementing this strategy?

❖ **Elaboration and Evaluation of Strategies:**

- Which development options or possible strategies for the future can be identified?

❖ **Strategic Plan (draft and final):**

- What would be the preferred strategy for the future of inland waterway transport for Brazil?
- What are the feasible measures (infrastructural, governmental, organizational, legal) contained in this strategy?
- What is the implementation timeframe for the measures?

1.4 SCOPE OF THE PROJECT

1.4.1 PHE as an Important Part of the Policy Cycle

Preparing a strategy is an important part of the action program cycle. The steps of the cycle are: analysis of information, developing measures and strategies, implementation and then evaluation (see Figure 1).

The scope of this project is to analyze the current situation and future expectations and to provide a strategy and measures capable of responding to the needs of this situation and future scenarios.

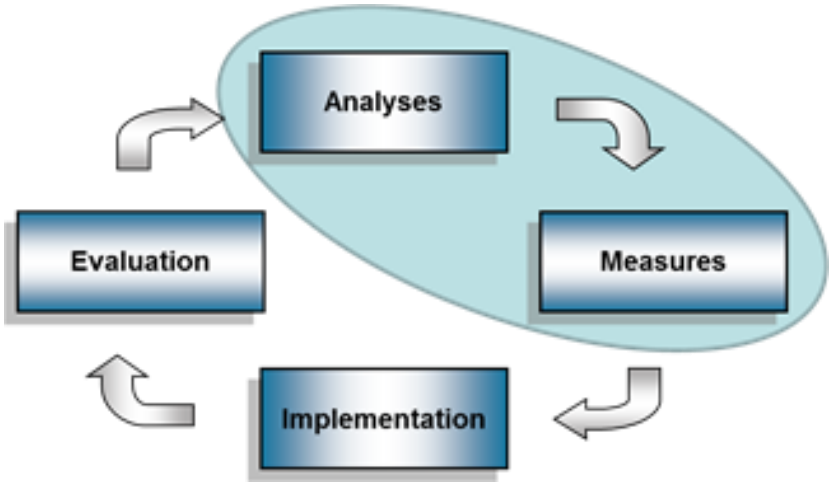


Figure 1 – The Policy Cycle

1.4.2 Geographical Scope

The strategic plan will be developed at the national level. Inland Waterway Transport is defined as transport of cargo or persons, in ships or vessels, upstream or downstream on rivers allowing navigation. Figure 2 presents the river basins and the sections of rivers to be studied, which are highlighted in red.

Figure 2 – Brazilian River Regions

Although the PHE comprises Brazil as a whole, the focus of this plan will be placed on the following river basins: Amazon, Tocantins, São Francisco, Parnaíba, Paraná-Tietê, Atlântico Sul, Uruguay River and Paraguai-Paraná.

The selection of the rivers to be studied is shown in the table below. It must be emphasized that, at the diagnosis stage, a survey will be conducted of the rivers whose feasibility to become navigable lies beyond the plan horizon. The criteria to be adopted will be based on navigability conditions and current cargo transport.

Thus, if it is determined that a river's cargo volume is not sufficient, its navigation conditions are poor or heavy investments are needed to make it navigable, that river will not be studied.

Table 1 – Selection of the rivers to be studied.

River Basin	Rivers
Amazon Basin	Amazonas River, Jarí River, Xingu River, Paru River, Tapajós River, Juruema River, Arinos River, Teles Pires River, Trombetas River, Uatumã River, Madeira Rivert, Mamoré River, Guaporé River, Negro River, Branco River, Solimões River, Purus River, Acre River, Japurá River, Iça River, Juruá River, Envira River, Tarauacá River
Tocantins Basin	Tocantins River, Araguaia River, Itacaiúnas River, das Mortes River,Javaés River
Northeastern Basin	Parnaíba River, das Balsas River
São Francisco Basin	São Francisco River, Paracatu River, Grande River, Corrente River
Paraná Basin	Paraná River, Amambaí River, Ivaí River, Ivinheima River, Paranapanema River, Tibagi River, Pardo River, Sucuriú River, Tietê River, Piracicaba River, São José dos Dourados River, Grande River, Paranaíba River
Paraguai Basin	Paraguai River, Miranda River, Taquari River, São Lourenço River, Cuiabá River
Southern Atlantic Basin	Jacuí River, Taquari River, Caí River, dos Sinos River, Gravataí River, Guaíba Lagoon/Lake, Lagoa dos Patos,Camaquã River Canal de São Gonçalo , Lagoa mirim, Rio Jaguarão
Uruguai Basin	Uruguai River, Ibicuí River, Chapecó River

1.4.3 Project topics, projections and horizons

The topics to be focused on in the project are the morphologic aspects of the river basins, the governance and institutional aspects of the transport systems, such as organization and cooperation of stakeholders, and the efficiency of waterway transport. This will be elaborated in chapter 2 (Vision of the project).

This waterway plan will be developed for the same planning horizon and based on the same reference data and projections as the PNLT.

- Short term (2015);
- Medium term (2019);
- Long term (2023, 2027 and 2031).

1.5 STATUS OF THIS DOCUMENT

This document contains the work plan for preparing a strategic plan for the IWT in Brazil and its purpose is to define the method, the relationships among the different elements and

stages, the timeframe, and to acquire a clear understanding of the final product and, more important, the cooperation between MT and ARCADIS. The plan was discussed with MT and this document represents the reviewed version of PHE Work Plan.

1.6 CONTENT OF THIS DOCUMENT

In Chapter 2 we explain our methodology, vision and research model. For all the main steps taken, we explain the goal, results and method. In Chapters 4 and 5 we explain the work planning and organization. The work plan will be concluded in Chapter 6, including an Appendix with references, short CVs of the coordination and technical team members and a preliminary PHE index.

2 VISION OF THE PROJECT

2.1 FOUR PILLARS OF SUCCESSFUL INLAND WATERWAY TRANSPORT

In our view there are four pillars of successful inland waterway transport (see Table 2).

Table 2 – Four Pillars of Successful Inland Waterway Transport

Economy of scale • Transport of large amounts of cargo • Long distance transport • Sufficient volume of passengers	**A competitive and sustainable transport system** • Low risk, high reliability • Accessible to the market • Low transport cost • Proper service level • Competes well with other modalities
A navigable river system/infrastructure (morphology) • Sufficient water depth • Maximum flows adequate for navigation • Good links with other modalities • Navigation guarantee regarding climate change • Secure navigation system • Navigation control and safety (RIS)	**Clear governance and institutions focused on sustainable development** • Governance and organization: an efficient institutional structure and clear legislation; • Adoption of policies for sustainable development (i.e., economy x environment) • Social interest

2.2 RESEARCH MODEL

The four pillars of successful IWT will be explored according to the research model presented below. Current cargo and passenger flow should match the current infrastructure and transport system. A calculation of economic development prospects determines what the possible future cargo flow may be. To be able to accommodate the possible future cargo flow, measures and strategies are needed to develop the inland waterways into a more efficient future infrastructure and transport system (see Figure 3).

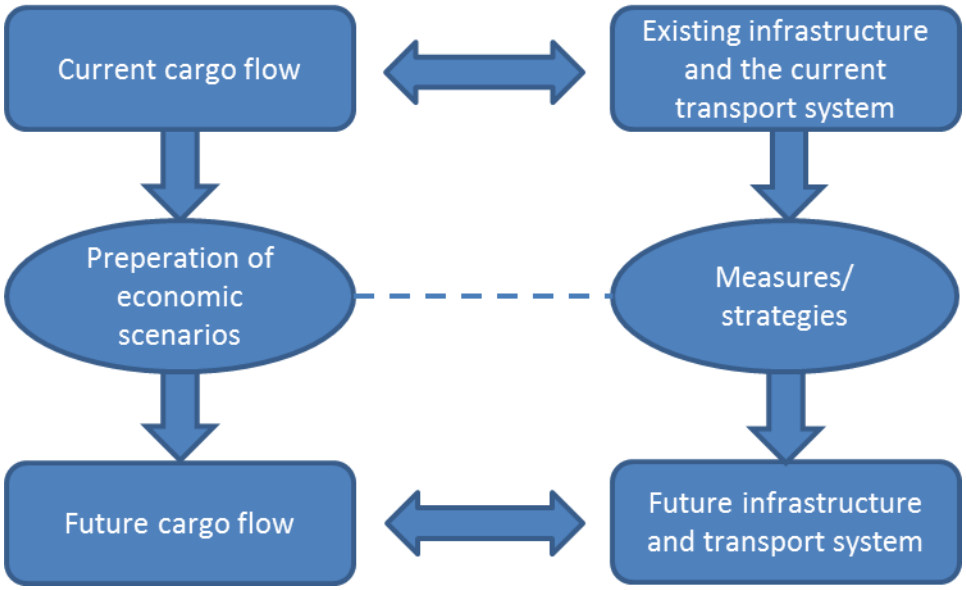


Figure 3 – The Research Model

It is important to clarify that in this table the term Transport System involves institutional, financial, social and environmental aspects.

2.3 MAIN ASPECTS OF THE METHODOLOGY

This work plan was designed with the following four key elements, which form the basis of the approach we propose for the PHE project.

1. Connect international knowledge and vision: Brazil, Europe, United States (U.S.)

ARCADIS is a global company, located in Europe, the U.S., and Latin America. In the project we will make use of our internal expertise.

- Our experts in Brazil, who have a long history of working with waterways and policy engineering, will advise on infrastructure and project management.
- The knowledge of Arcadis staff in Europe will provide relevant expertise during the whole/entire project. Dutch experts have knowledge of the commercial side of barge operation, European strategies for inland waterway transport, port and inland waterways management and economic and hydrological expertise.
- From the U.S, we will bring experts on transport on the Mississippi River and the area of the Great Lakes.

2. Connection to the market, its demands and future potential

From the vision of inland waterways, development starts with demand from the market. If no competitive advantage exists or will exist for companies to make use of IWT, there is no use in maintaining and further developing the waterways. Therefore, during the investigation we connect with current and potential end users of the waterways, such as shipping, cargo and passenger companies and governmental organizations. Their opinions and advice about the

current and future situation will be taken very seriously in our work. We will take current and potential future demand as a starting point. The organizational, governmental, environmental, legal and infrastructural possibilities should be supportive to meet the potential future demand. The second step of the analysis will therefore be to check and discuss conditions and possibilities with partners, such as municipalities and environmental groups, and find the opportunities in the river basins in order to determine feasible measures to improve the IWT system.

3. Strong basis of data, focusing on key elements

As the project stages are carried out, a database will be developed containing information on the existing and future situation, such as land use and occupation, current infrastructure, freight and cargo.

The environmental and social aspects that may be influenced by this project will be mapped and analyzed. This will facilitate the licensing process and implementation of the waterway plan. This reduction of barriers leads to greater project efficiency, not only reducing implementation time, but also the costs related to it.

4. A clear process with the right focus, allowing development of a solid strategic plan

We have designed a clear process in which we have defined the major steps for this project and how these steps are connected. The restricted/limited time requires the right focus on topics and clear definitions of the interfaces between the different steps and activities of the study.

It is important to have timely confirmation of (draft) documents and input on policies from the Ministry of Transport as a client. Thus, there will be clear and efficient communication between the MT and the Consortium.

3 DESCRIPTION OF THE WORKING PROCESS

3.1 INTRODUCTION

Several steps will be taken during the development of the PHE, some which are complementary to each other and some which are implemented at the same time. The overall process scheme we developed for the project is shown in Figure 4.

The following steps are described in the paragraphs below:

- Step B: Stakeholder Consultations
- Step C: Assessment and Diagnosis
- Step D: Elaboration and Evaluation of Strategies
- Step E: Formulation of the Draft Strategic Plan
- Step F: Preparation of the Final Strategic Plan

The result of step A (Work plan/ mobilization) is this work plan. During preparation of this plan we conducted a quick scan of the current situation. This quick scan will be finalized soon after the actual start of the project and will help to bring focus to the research and to prioritize (parts of) the river basins. A basic level of research is necessary for each river basin. However, a customized strategy for the most promising areas in Brazil requires focus on certain points in the process.

Meeting 2: Discussing the work plan, input from ARCADIS and MT in the project and work focus.

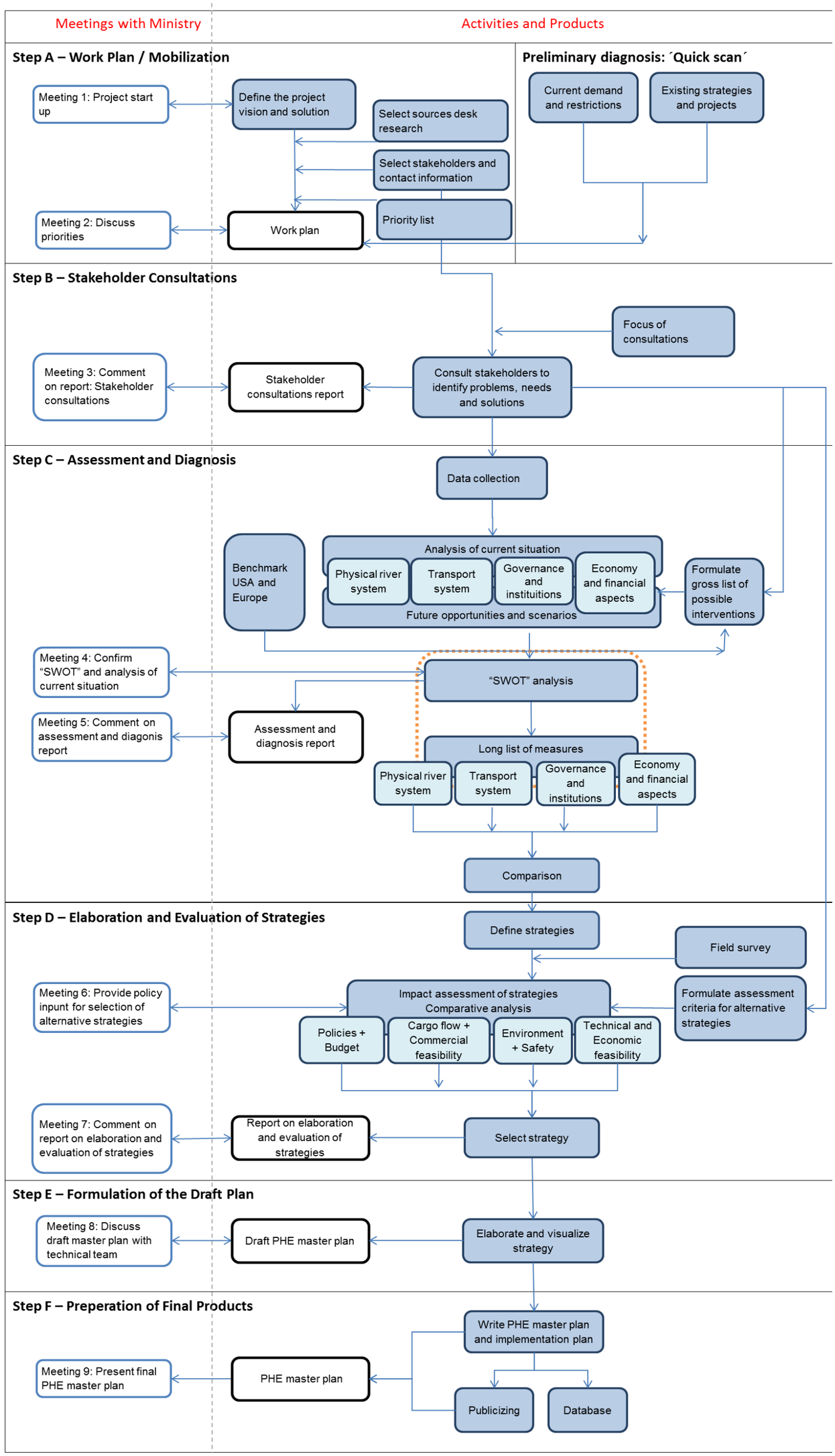


Figure 4 – The Work Process

3.2 CONSULTATION OF STAKEHOLDERS (STEP B)

3.2.1 Vision of the consultation

The public consultation is an essential step that will provide important information for the development of an effective strategy for the IWT. Several stakeholders play different roles and positions in the field of operation of inland waterways. They will all be important in the implementation phase of the strategy following this project.

Therefore, we incorporate this consultation at an early phase (step B) of the project process. The results of the consultation will be recorded in a stakeholder consultations report. The results will be used in steps C and D while preparing the strategy. During the consultations we will address several topics aiming at identifying the opinion of the stakeholders about the current situation, demands and restrictions on the use and development of IWT, possible solutions and other important criteria in order to present the vision that IWT is a feasible transport alternative.

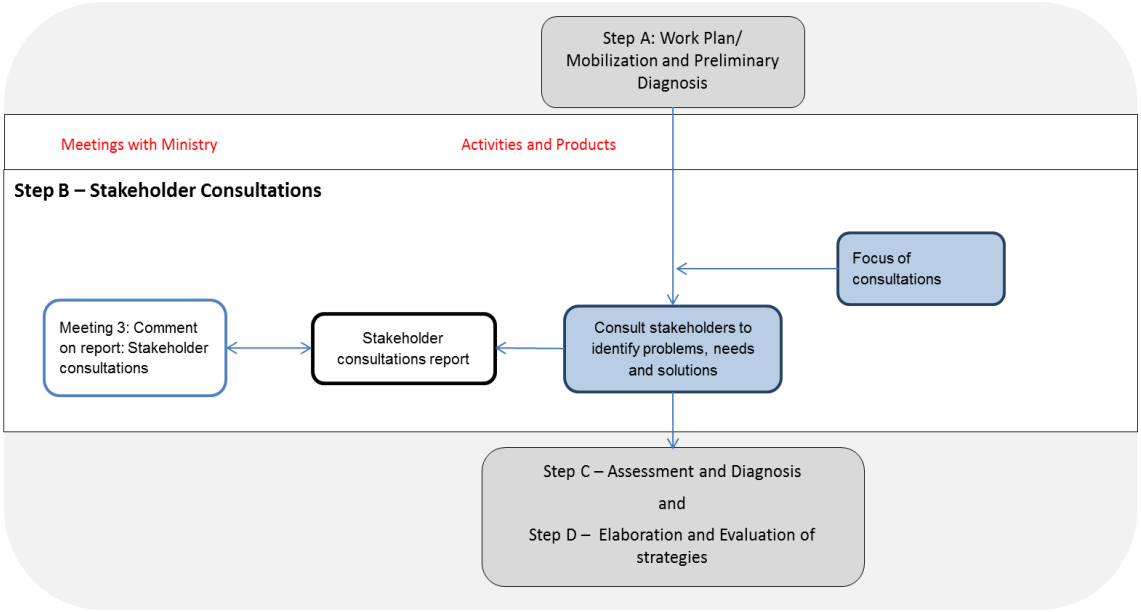


Figure 5 – The Work Process: Step B

3.2.2 Aim and vision on the approach

The stakeholders will be consulted in an open inquiry. This will prevent a one-sided and biased view. By consulting various stakeholders with different, possibly even contradictory interests, during separate meetings, an atmosphere of open discussion can be created. Our knowledge of the current situation will be deepened and our views of future scenarios will be developed in a balanced way, inspired by input from various perspectives.

1. Win-win situations

It will be very difficult to implement a strategy without support. Different stakeholders have different interests. To develop a successful strategy, it is important to understand these interests and the reasons behind them. By understanding the interests of stakeholders, it is

possible to gain support and create win-win situations which have been the key to success for many projects all over the world.

2. Two levels of consultation

We will start our public consultation at the national level, after which we will apply the acquired knowledge to the different river basins. By using this method we ensure that generic interests and 'regional/local' interests will be heard. Also, this method makes it possible to determine the focus of the consultation. At the national level there will be an idea about opportunities and potential interesting areas. For example, instead of giving each river basin the same attention, it may be better to focus on those areas with the most potential.

3. Knowledge

The consulted stakeholders may add their knowledge of navigation in their region and thus help decision making. The studies addressed in this work are on a macro scale and the plans and studies for each basin will address more details.

Thus, consultation of stakeholders involved in the operation, management and protection of waterways is an efficient way to obtain and confirm information that would require more time by means of field surveys.

4. Sustainable development

Today, cargo transport in Brazil currently depends mostly on highway and railway modalities. These modalities are less competitive in relation to transport large volumes over long distances. Thus, expansion of the waterway modality is very interesting. In addition, fuel consumption rates, air pollution, noise and accidents involving fatal victims are lower and more cargo per trip is transported, with a higher durability of the transport vehicles.

When comparing modalities, environmental aspects need to be considered for planning purposes, in order to minimize potential impacts on traditional communities and the flora and fauna along the rivers. To ensure sustainable expansion of waterway transportation, consultation of stakeholders is particularly important. It provides material for the analysis of the critical social-environmental points to be developed in this study and detailed in the assessment and diagnosis phase (Step C) of this Work Plan.

3.2.3 Main questions

Activities will be focused on the "four pillars" that are part of the process in steps C and D.

- Cargo with economies of scale
- A competitive transport system with adequate efficiency levels
- A navigable river system/ infrastructure
- Governance and institutions with clear assignments focused on sustainable development.

In these steps, the current situation, potential problems and future opportunities will be investigated for all four pillars. Potential measures and criteria to assess strategies and other stakeholder demands will also be gathered.

Some examples of relevant questions are shown each pillar. The questions will be asked to different representatives. Not everyone will have the knowledge necessary for all four pillars.

1. Governance and institutions

- What are the current restrictions to river transport use with regard to the institutional and regulatory system?
- How is cooperation between the waterway authorities, the river basin committees, the national water agency and energy companies? Who are your main partners within your territory? Have you ever experienced conflicts? If yes, how were they solved?
- Is the institutional organization (Brazilian Water Law) effective in your opinion? Do you see possibilities for optimization? In your opinion, are the competences and mandates of the institutions well defined? Is the institutional organization suitable and prepared for the challenges of the near and distant future?
- What types of funding are available for projects for maintenance and improvement of waterways and how effective does the current system of funding work?

2. Physical river system, environment and social aspects

- Within your work area, what river sections are suitable to become waterways?
- Is river monitoring data available (variation of the water surface, river silting, bank erosion, etc.)?
- What interventions should be considered to allow navigation by larger vessels?
- Do you expect major changes in meteorology, hydrology, discharge regime, sediment transport or morphology within the river basin due to future developments like climate change, demographic developments (agricultural or urban water extraction), planned projects (dams, hydropower plants), etc.? If yes, could you specify these expectations? Could this hinder the development of navigation on the waterways?
- For an environmental assessment of solutions, what types of impacts should be studied?

3. Transport system

- What are the main routes in operation?
- Are problems expected when water transport is enhanced?

- Which existing waterways already show bottlenecks in the current exploitation for cargo and/or passenger transport? What kind of bottlenecks are there? What solutions would you suggest?
- Do you experience constraints in navigability of your waterways due to other interests (water supply for agriculture, urban developments, hydro power)? If yes, are these conflicting interests handled in a well-balanced way?
- Which existing routes do you believe should be upgraded for bigger vessels?
- The Ministry of Transportation would like to achieve a minimum of 42,000 km of navigable waterways in Brazil in the long run, which is a major extension of the current navigable length. Within your waterways network, which river routes would be suitable to become navigable in the future?

4. Economic and Financial Features

- What types of cargo are transported?
- Are changes foreseen in cargo movement over the next 20 years?
- How competitive is the river transport modality with the other modalities available in the region? What advantages do you see in this transport modality?
- What are the costs of the different modalities?
- What types of funding are available for projects for implementation, maintenance, and improvement of waterways?
- What are the recognized current and projected transport flows for the IWT system?
- What kind of production and consumption do you foresee for the next 20 years (agricultural bulk, mineral bulk, liquid bulk, materials for civil construction, etc.)?
- What flows, services and transport routes are expected?
- Is it possible for new cargo to be transported by waterway based on the experience of other regions? For example, could ethanol, which will be transported by the Tietê-Paraná waterway, be potential cargo for other regions?
- Waterway transport is oriented mainly towards export and there is usually little return cargo, which could make it more profitable. Thus, what may be possible return cargos (fertilizers, containers)?
- Could the use of new vessels, perhaps bigger or with shallower draft, increase the competitiveness of river navigation?
- Could cooperation with other transport modalities during times of drought increase the share of river transport?

- Constraints on use or increased use of waterway transport. What aspects need to be considered for choosing waterway transport (costs, safety, reliability etc.)?
- Idem for resources for non-transport use (for example electricity, tourism, ecology, etc.)?
- Constraints on measures: How can we create the best situation? Do you have measures in mind (generic and location-specific)?
- Are users willing to pay for the use of a waterway transport system?

Stakeholders will also be questioned about criteria they think are important to assess future strategies. They can give their input on how different strategies should be compared.

3.2.4 Organization

ARCADIS will give suggestions for stakeholders (see Table 4) to consider. This will result in a long list that will be discussed with the technical team of the Ministry of Transportation. The MT already has a list of suggested focus points for each river basin and the stakeholders list will be included in the discussion. After consulting the MT, stakeholders will be invited to participate. ARCADIS will draft the invitation, which will be ideally sent by the Ministry of Transport. This way the invitation will gain importance and stakeholders will have a bigger incentive/will be more likely to attend. Logistics, such as the data for meetings, locations, etc., will be organized by ARCADIS Brazil and the program of the meetings will be determined by ARCADIS Netherlands together with ARCADIS Brazil, all in close cooperation with the Ministry of Transportation.

Meetings will be organized, initially with the waterway administrations, to learn about their responsibilities and ideas and also to define the focus of the meetings with other stakeholders.

Later meetings will be organized with priority stakeholders located in the Brazilian territory.

Two options were considered for conducting the meetings:

- Interviewing priority stakeholders
- Meetings with geographical focus on river basins with several stakeholders

We propose to organize meetings with priority stakeholders, due to the difficulty in organizing interviews at the beginning of the work resulting from the stakeholders' busy agendas and from the characteristics of the information to be gathered, often addressing data that are not available to the general public. By allowing stakeholders to discuss questions at meetings with a distinguished group of participants, we expect to create an open atmosphere in which participants feel free to communicate. This way, questions may be addressed in a more detailed way. At the interviews stakeholders will feel more comfortable to criticize and disclose the business strategies adopted by their companies.

Stakeholders with broad knowledge, experience and interests probably need more time than other stakeholders. In order to comply with the schedule presented in this work plan, we estimate that about 50 interviews will need to be scheduled.

Part of the planned interviews, together with additional interviews that will be identified as relevant during the consultations (Step B), may be conducted by video conference calls. These will be organized especially in cases where locations and stakeholder schedules may cause delays in the work.

To obtain the maximum possible number of answers to the questions, we propose to send the main questions to be addressed during the meetings, to the three groups of selected stakeholders, well in advance, since they comprise aspects of the already mentioned four pillars (see Figure 6). To have an interactive discussion we can only have a limited number of people in each session, so it is very important to find representative people for each group.

3.2.5 Stakeholders to be questioned

Stakeholders from different types of organizations are involved in navigation. The different groups are presented in Figure 6.

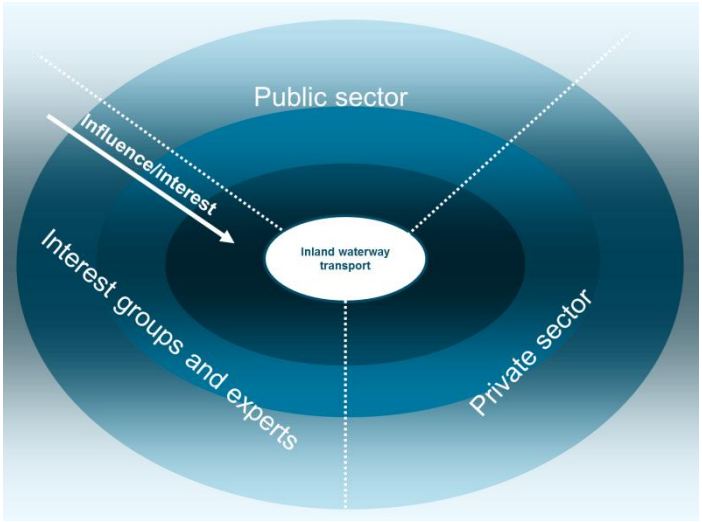


Figure 6 – Three Major Groups of Actors

The public sector, including the government and policy makers, has significant influence, because it can create constraints under which inland waterway transport can develop; among them we can find:

- National and local government institutions which are connected to all aspects of river policy.

The private sector includes users of inland waterways (cargo, passenger and other uses), terminals, shippers, industries, tourism, etc. In the end, the feasibility of waterway transport will be decided by the users. They mainly influence the first two pillars: Cargo with economies of scale and a competitive transport system. The following groups stand out:

- Representatives/decision makers from the logistic chain: Producers, terminal operators, port operators, waterway operators (cargo and passenger), tourism operators, etc.

Several interest groups and experts will have to be consulted as well. The main concerns of interest groups may lie in the social and environmental impact. Expert opinions are needed to reflect the different ideas and checking their feasibility and knowledge can, of course, be used as a benchmark. Although the team has experts in the area, experts from different regions in the country can contribute with local knowledge.

- Companies and organizations that depend on rivers, such as energy companies, drinking water companies, etc.
- Civil society representatives: Funai, unions, producer associations, etc.

For the project it is important to have representatives of each group of the four pillars. A list of stakeholders was prepared and discussed with the MT to start the interviews. For identifying more relevant stakeholders, waterway administrations should be consulted.

3.2.6 Locations and planning

The table below shows the cities we, together with the Ministry of Transportation, initially had in mind for holding the meetings. They are organized in the different basins to be studied. Since this plan proposes to conduct interviews, it may be necessary to visit a larger number of cities. This may require adjustments in the selection of localities during the development of the work.

Table 3 – Locations for the Meetings

Areas/basins to be covered	Local	Administration
Amazonas	Manaus	AHIMOC
Madeira	Porto Velho	AHIMOC
Araguaia-Tocantis	Palmas	AHTAR
Juruena - Teles Pires - Tapajós	SINOP or Santarém	AHIMOR
Parnaíba	Teresina	AHINOR
São Francisco	Juazeiro	AHSFRA
Tietê – Paraná	São Paulo	AHRANA
Paraguai	Corumbá or Ladário	AHIPAR
Taquari – Jacui	Porto Alegre	AHSUL

Most of the meetings will be held in September and October 2012, depending on the availability of the participants. It is important to finish Step B by mid-November in order to have the information available for Steps C and D of the process. We will start with the preparations immediately after approval of this work plan (or part of it).

3.2.7 Compilation and analysis of results

Minutes will be drafted for each meeting. These minutes will be shared with the participants and they will have the opportunity to reflect on the information by email. The minutes will be

divided into the four subjects (Physical river system/environment/social aspects, transport system, governance and institutions, economic/financial aspects) and a general part describing stakeholder interest and the opportunities, restrictions and demands they express about inland waterway transport. This will make processing the information in Steps C and D easier.

The main results of the consultation will be combined and displayed in a report. The results and the report will be discussed with the MT in a meeting. After the meeting, the comments will be processed and then the stakeholders report will be finalized.

Meeting 3: *Discuss and retrieve comments on report of stakeholder consultations*

Sub-Result: *Final report on stakeholder consultations*

Table 4 – Main Stakeholders:

Region	Public Sector		Setor Privado		Interest groups / experts
	Waterway Administration	Public Authorities	Shipping companies/ Shipyards	Industries	
RH Amazônia	AHIMOR (Belém) AHIMOC (Manaus)	Port authority counsil–CAP Porto Velho river precinct DOCAS Pará Public works–OGMO Secretary of environment- SEMA - AM State secretary of transport for government of Pará - SETRAN Port and waterway society of state of Rondônia - SOPH Regional Unit of the National Agency of Waterway Transportation	AMACON - Ind. e Const. Navais Ltda Amazon Norte Transporte e Navegação Transportadora Bertolini Ltda. (Maggi). Comercio e Navegação Prates Companhia de Navegação da Amazônia - Grupo Libra EASA - ESTALEIRO EMPRESA DE NAVEGAÇÃO LUAN LTDA – ME EMPRESA DE NAVEGAÇÃO SOUSA LTDA ERAM - Estaleiro ERIN - Estaleiro Rio Negro Hermasa Navegações S.A (Grupo Maggi) Hidrovias do Brasil J. MOREIRA DE AZEVEDO MAJONAV TRANSPORTE FLUVIAL DA BACIA AMAZÔNICA LTDA. MC LOG S/A TRANSPORTE E LOGÍSTICA COSIPAR Empresa de Navegação REICON - Reicon Rebelo Indústria Comércio e Navegação Ltda Rio Maguari - Estaleiro	BR Distribuidora	
RH Tocantins	AHITAR (Palmas)	Deparmetn of planning- SEPLAN - TO Secretary of environment - SEMA - TO	Transportadora Bertolini Ltda. (Maggi), MC Log (USIPAR Empresa de Navegação)	Vale	
RH Parnaíba	AHINOR (São Luís)	National transport confederation- CNT Hydroelectric company of São Francisco - CHESF Development company for the development of São Francisco e Parnaíba - CODEVASF Secretary of environment- SEMA MA Department of planning- SEPLAN - MA	PIPES - Transporte por navegaçao de travessia intermunicipal Rio Tiete - Estaleiro Transnordestina Logistica S.A.	OCEANA BRASIL Suzano Energia Renovável Suzano Papel e Celulose (Projeto Grandis – escoamento celulose fábricas Imperatriz e Teresina) Usina Agroserra - São Raimundo das Mangabeiras-MA Usina Itajubara - Coelho Neto-MA Usina COMVAP - União -PI - Grupo Olho Dágua	Aprosoja - Association of soybean and corn producers Amazon river pilotage association AVIP - Association of poultry farmers Rio Madeira cooperative miners CONAPRA- National board of pilotage
RH São Francisco	AHSFRA (Pirapora)	CEMIG - Energy company of Minas Gerais CBH - SÃO FRANCISCO CHESF-Hydroelectric company ofSão Francisco River basin committee of Rio Grande Department of planning state of Bahia Special secreatry for naval industry and ports (SEINP) Department of planning - SEPLAN - PE	Porto Fluvial de São Francisco Paraguaçu Transportes e Logística	ICOFORT - AGROINDUSTRIAL	Federation of agriculture and livestock state of Rondônia – FAPERON FEDERATION OF INDUSTRIES MARANHÃO – FIEMA FEDERATION OF INDUSTRIES PIAUÍ – FIEPI FIERGS - FEDERATION OF INDUSTRIES Rio Grande do Sul FIESP - Federation of industries São Paulo SINAVAL – national union of industries naval construction and repair offshore S I N C O N A P A – union of industries naval construction state of Pará SINDAREIA/SP - union of industries sand extraction in state of SP SINDPEDRAS/SP - union of industries Mining crushed stone in state of SP union of industries for naval construction, nautics, offshore and repair in Amazone Union of companies for inland navigation and lakeside navigation in State of Pará
RH Paraná	AHRANA (São Paulo)	5th naval district 8th naval district River basin committee- CBH - Paranaíba Rvier basin committee- CBH - Paranapanema Security control of ports- CODESP Waterway administration- DH - SP State department of transport and logistics Secretary of environment- SEMA SP Secretary of planning- SEPLAN SP Secretary of transport- SETRAN SP	Areias Salioni Machado LTDA Caramuru Cavalliere D Agostine Empresa Paulista de Navegação Ltda Mineração Floresta de Guaíra PBV Transportes Rumo Logística - Grupo Cosan TNPM Louis Dreyfus Commodies Brasil S.A. TORQUE	ARMAZEM NOVA ROSEIRA CARAMURU DNP Indústria e Navegação Ltda Eldorado Papel e Celulose Luis Dreyfus Commodities Brasil S/A (Consorciado do TEGRAM). Mineração Mercantil Maracaju Mineração Mercantil Maracaju Mineração Morumbi Importação e Exportação NOVA AGRI - Consórcio TEGRAM PETROBRÁS/TRANSPETRO	
RH Paraguai	AHIPAR (Corumbá)	Department of agrarian development, production of commerce and tourism Secretrary of Envionment, planning and techological science - SEMAC	Navariver navegação fluvial (Grupo H. Dantas), Serviço de navegação da Bacia do Prata, Hidrovias do Brasil	Agroindustrial do Centro Oeste Associação dos produtores de soja e milho do Estado do MT - APROSOJA COABRA - Cooperativa BUNGE CARGILL Vale	
RH Atlântico Sul	AHSUL (Porto Alegre)	Watershed management committees BOARD OF WATER RESOURCES - CRH DEPREC - State department of ports, rivers and canals-DEPREC State foundation of environmental protection Henrique Luiz Roessler RS Secratary of environment- SEMA RS Superintendant of ports and waterways- SPRH	Laçador Navegação LDTA-EPP Navegação Aliança LTDA (Grupo Trevisa)	Açucar Guarani AS American River Transportation Company (ARTCO), subsidiary of ADM Fibria Gerdau AS GUZEIRAS DA REGIÃO DE SETE LAGOAS LAFARGE LIASA São Martinho AS	
Federal		ANEEL - National agency for electric energy ANTAQ - National agency for waterway tranport ANTT - National agency for land transport ANVISA - National sanitary surveillance agency CODOMAR - DOCAS Maranhão CONAMA/IBAMA - National envirnment counsil National water resource council Ministry of Planning Waterway board- DNIT DNPM - National mineral prouduction department EPE - Energy research company FUNAI - National Indian foundation INCRA - National institute for colonization and agrarian reformation Chico Mendes institute for BIO conservation IPHAN - Institute of History Brazilian Navy, directory of ports and coast Directory of waterway navigation Ministry of Agriculture: CONAB - Companhia National supply Ministry of Defence Ministry of Integration Ministry of External Relations	CONAPRA-Conselho Nacional de Praticagem Confederação Nacional do Transporte FENAVEGA - Federação Nacional das Empresas de Navegação Marítima, Fluvial, Lacrustre e de Tráfego Portuário SINAVAL – Sindicato Nacional da Indústria da Construção e Reparação Naval e Offshore	Confederação Nacional da Indústria, Confederação Nacional da Agricultura,	

3.2.8 Connections with other elements/ steps in the process

As explained before, consultation of the stakeholders will provide input for Steps C and D of the process:

- Assessment and diagnosis
- Elaboration and evaluation of strategies.

The following data will be gathered during stakeholder consultation: the current situation, potential problems and future opportunities for the four research areas mentioned in prior paragraphs for all eight river basins.

These data have a direct connection with the evaluation. This is the foundation on which measures and strategies will be formulated. A provisional list with possible measures will also be prepared during this step. In Step D, the strategies will be drafted and criteria will be adopted to select and evaluate the strategies.

3.3 EVALUATION AND DIAGNOSIS (STEP C)

Evaluation and diagnosis is a very relevant step of the project. The main objective of this step is to analyze the current situation and the development prospects and formulate measures to improve inland waterway transport.

In this step, the data collected in the Quick Scan and the information analyzed from stakeholder consultations (which partly follow the same timeframe) will serve as a basis for identifying the need for additional research and field surveys. Also, the best practices of inland waterway transportation in Europe and the U.S. will be evaluated.

With this information it will be possible to develop a good understanding of the strengths, weaknesses, opportunities and threats with regard to inland waterway transport in the four research areas (Physical river system/environment/socials aspects, transport system, governance and institutions and economic/financial aspects) and to set up some measures for inland water transport. The next paragraphs will detail the activities that will be performed during this step.

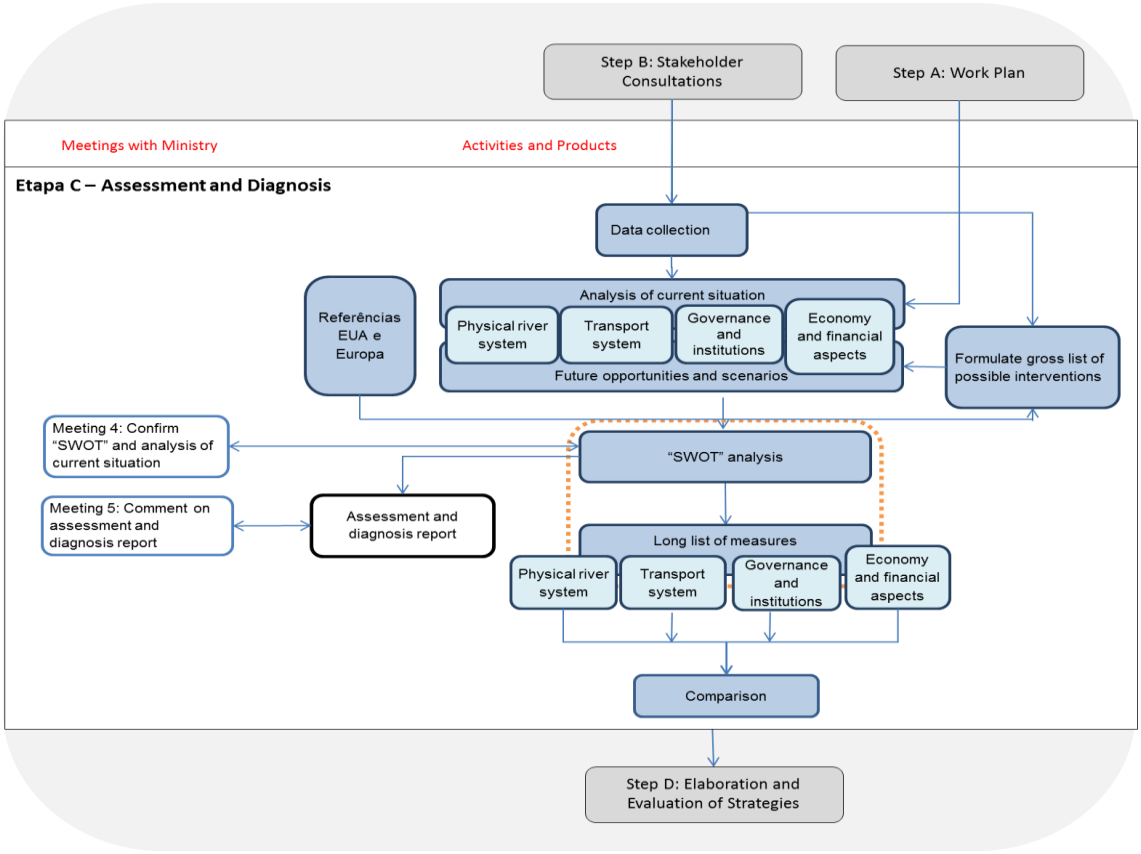


Figure 7 – The Work Process: Step C

3.3.1 Quick scan, literature analysis, interviews and field survey

The data gathering will include two activities, namely: Survey and Analysis of Available Studies and Interviews. Since there are prior studies in the different river regions, the diagnosis will be made essentially based on secondary data, as the time available for the data survey is very limited. Thus the survey and analysis of the available studies is very relevant for the progress of the work.

1. Survey and Analysis of Available Studies

Our main sources of data will be previous studies (including the PNLT) and interviews (mostly during the consultation step). During formulation of the work plan we already started this information gathering. It will be conducted before and during the analysis of the current situation of the four research areas: Physical river system/environment/social aspects, transport system, governance and institutions and economic/financial aspects.

Table 5 shows a preliminary list of studies and plans that are relevant for the development of the PHE at this first step of the work. The majority of the listed documents the information is not available to the public. Only after a detailed analysis of their content, as to information quantity and quality, will it be possible to see their relevance for this study.

Table 5 – Preliminary List with the most relevant Policies, Plan and Studies

Plans	Year	Data available		Relevance to studies	Client
PNTH (Política Nacional de Transporte Hidroviário)	2010	Yes	Guidelines for the Definition of sector waterway locks priority investment	Presents guidelines for the sector waterway, listing plans which will be used as support for PHE	Ministry of Transport
PNLT (Plano Nacional de Logistica e Transportes)	2010	Partial	Database current and future transportation, matrix O / D current and future products selected data freight transport modes.	Can be used as a basis for guidelines for the sector. Presents waterway, listing plans which will be used for the support of the PHE data PNLT 2012	Ministry of Transport
PNLT (Plano Nacional de Logistica e Transportes)	2012	Yes	Database current and future transportation, matrix O / D current and future products selected data freight transport modes.	Should be used as the basis for the development of PHE as ToR. Latest version of PNLT that should be used in PHE	Ministry of Transport
PNIH (Plano Nacional de Integração Hidroviária)	2011/ 2012	No	Database information on the cargo flow into waterways, freight modes of transport, cost and time of transhipment and storage, the percentage of losses for transhipment of cargo terminals hydro and rail.	Database should be used for the development of PHE	Ministry of Transport/ ANTAQ
Caracterização da Oferta e da Demanda do Transporte Fluvial de Passageiros na Região Amazônica	2012	No	Database containing characterization of terminals; identification of shipping lines; characterization of vessels; passengers and quantifying	Database should be used for the development of PHE	Ministry of Transport/ ANTAQ
PNLP (Plano Nacional de Logistica Portuaria)	2012	Yes	Data relating to: current and future flows of goods in Brazilian ports, Master Plans Strategic ports;	Identify existing projects in the port area that may impact the development of water transportation.	SEP
PAC 2 (Programa de Aceleramento do Crescimento)	2010	Yes	Planned investments in the transport sector	Identify investment priorities of the federal government in the transportation sector	Ministry of Planning, Budget and Management
Plano Decenal de Expansão de Energia-2020	2011	Yes	Investments for the energy sector, the expansion plan of new HPPs and TPPs, forecast fuel production.	Identification of HPPs to be implemented by 2020, identifying regions producers and exporters of fuels.	MME-EPE
Avaliação Ambiental Integrada das Bacias dos rios: Araguaia, Juruena, Teles Pires, Paraguai, Paranaíba, Parnaíba, Tocantins.	2006 - 2011	Yes	Survey of the physical, socio economic and environmental impacts of watersheds, surveying the use and occupation of land. Studies and environmental analyzes.	Determination of physical, socio economic and environmental conditions watershed study	MME-EPE
Estudos de Inventário Hidrelétrico dos Rios em análise. (Ex: rio Tapajós, Uruguai, outros)	selecionar os inventários relevantes	Yes	Topographic surveys of the field, Sections Topobatimétricas, Hydrometric measurements, Hydrological Studies and sedimentometric, geological studies, Division of Water Levels and Falls reservoirs.	Study of fluvial morphology of rivers. Survey of flow regimes of rivers and reservoir operation. Determination of the necessary infrastructure for viable waterways.	MME-ANEEL
Macrozoneamento Ecológico-Econômico da Amazônia Legal e outros estados		Partial	There MacroZEE for all states and the methodology is not uniform among them	The MacroZEE is a tool to assist in planning, land use and planning and compiles different levels of information.	MMA and State Secretaries
Avaliação Ambiental Integrada - Aproveitamentos Hidrelétricos da Bacia Hidrográfica do Xingu	2009	Yes	Identification of impacts to the ecosystem and socioeconomics; guidelines and recommendations for the Xingu Basin	Identification of relevant data for the Xingu Basin	Norte Energia S.A.
Plano Estadual de Logística de Transportes do Estado do Pará	2010	Yes	Analysis of local demand for transportation waterway, lifting interlocutors institutions and challenges for the state.		State Secretary of transport of Pará
PGO (Plano Geral de Outorgas)	2012	No	Volumes and projected loads, load flow and regions where there is potential; road, rail and waterway deployed or planned	Indication of the priority areas for the installation of public ports or cargo terminals	Ministry of Transport/ ANTAQ
Termo de Referência para a contratação de Serviços de Consultoria Técnica para a Elaboração de **Estudos de Viabilidade Técnico-econômica e Ambiental – EVTEA** e os projetos Básico e Executivo de Engenharia de : -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO NA **HIDROVIA RIO PARNAÍBA**; -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO NA **HIDROVIA DO SÃO FRANCISCO**; -SINALIZAÇÃO DE MARGEM, BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO DA **HIDROVIA DO TAPAJÓS/TELES PIRES/JURUENA**; -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO DOS **RIOS DA BACIA DO PARANÁ**; -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO NA **HIDROVIA DO TOCANTINS ARAGUAIA**; -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO NA **HIDROVIA BRASIL-URUGUAI**; -PARA MELHORAMENTOS NA **HIDROVIA DO RIO MADEIRA, MAMORÉ E GUAPORÉ;** -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM NA **HIDROVIA DO RIO PARAGUAI.** -SINALIZAÇÃO DE MARGEM E BALIZAMENTO, DE DRAGAGEM E DE DERROCAMENTO NA **HIDROVIA DO AMAZONAS.**	2012	Yes	Characteristics of "Waterways" and navigable rivers to be studied	Indication of rivers with potential for navigation and information about navegability conditions	Ministry of Transport/ DNIT / CODOMAR

The PNLT (National Plan for Transportation Logistics) version 2012, in particular, should be delivered to this Consortium on time, in other words, in July, making analysis of the data during the diagnosis phase possible. Other plans that we also consider of ultimate importance are the PNIH (National Integration Plan of the Waterways) and PNLP (National Plan of Port Logistics), which also should be delivered, even in their preliminary versions, as soon as possible by the MT, in order to make interaction between the transport sector plans possible and avoid delays in the work.

2. Interviews

Interviews with the different stakeholder groups should be conducted at the beginning of the work. Paragraph 3.2., Consultation of Stakeholders (Step B), of this report includes the description of goals, the approach to be adopted and how the compilation and analysis of the results obtained in the interviews will be made.

3.3.2 International benchmarking: The U.S. and Europe

In order to enable innovations when preparing the strategic plan for inland waterway transport in Brazil, international experience concerning this topic will be analyzed.

Benchmarking is a method by which products and/or performances of different organizations or areas are compared. Results of benchmarking are used for improving performance, processes, and products.

For this project, the aim of the benchmarking is to gather best practices of other countries that have well-developed inland waterway transport system. The results of the comparison, considering local characteristics, will be used for the development of measures and strategies. ARCADIS will provide a benchmark that will be the reference, at a macro level, for the following elements: types of ships, management, incentive programs, organization, policies and crew.

3.3.3 Scope of the benchmark

- U.S. and Europe
- Focus on the development of inland waterway transport in these countries.

  As stated, in our vision there are four pillars for successful inland waterway transport. These four pillars will be the central investigation elements. Within these four pillars, a few selected topics will be part of the benchmarking. The investigation focuses on these topics and they will be compared to each other in order to obtain best practices.

  - Physical river system
  - Transport systems
  - Governance and institutions
  - Economic/ financial aspects
  - Social aspects
  - Technological innovation

The major objective of the benchmarking is to analyze best practices and international examples providing input to the study.

3.3.4 Approach

The benchmarking will be divided into four steps, described in the figure below.

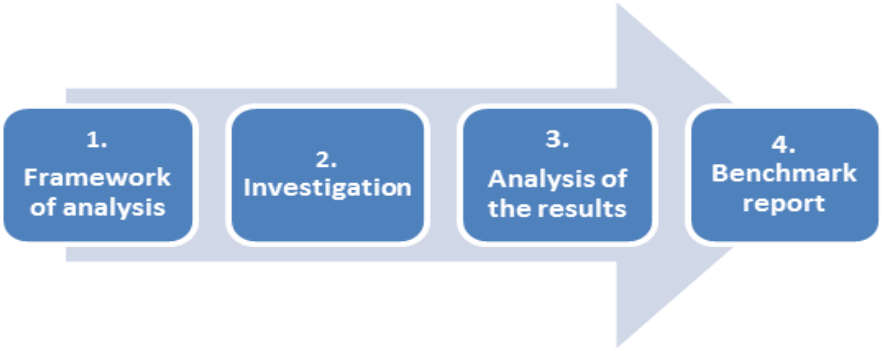


Figure 8 – The Benchmark Steps

1. **Set up of a framework of analysis**

- Inspired by the first analysis of the current situation in Brazil and the pillars of a successful inland waterway transport system.
- Define the criteria by which the countries will be investigated (i.e., use of several topics which are components of the four pillars).

2. **Investigation**

- Secondary data research: select literature, analyze literature and give a short description, with an overview for both continents on how the four pillars are developed.
- Interviews: set up an interview protocol (questions), select who is going to be interviewed (0-10 interviews for U.S. and Europe, for instance, with government representatives, shipping organizations, environmental interest groups, port authorities, owners of vessels).

3. **Analysis of results**

- Discuss the main results in the European experts meeting, videoconferencing with Brazil.
- Compare results to the analysis of the current situation.
- Indicate results relevant to the situation in Brazil. These results are the best practices that can be used in the strategic plan.

4. **Preparation of the report on the performance comparison**

- Prepare a list indicating good practices.
- Finalize the performance comparison chapter.

3.3.5 Analysis of the current situation: Economic and Financial Aspects

3.3.5.1 Introduction

The economic and financial aspects of inland shipping are based on transport availability and efficiency. The first step related to the economy is, therefore, insight into the transport process. This involves both demand and supply. The demand for inland waterway transport depends on the total demand for transport on defined corridors (the influence area of a waterway). The main components related to the economic aspects of transport and the relations with the components of the PHE are given in the next figure, which shows the work process in a brief way.

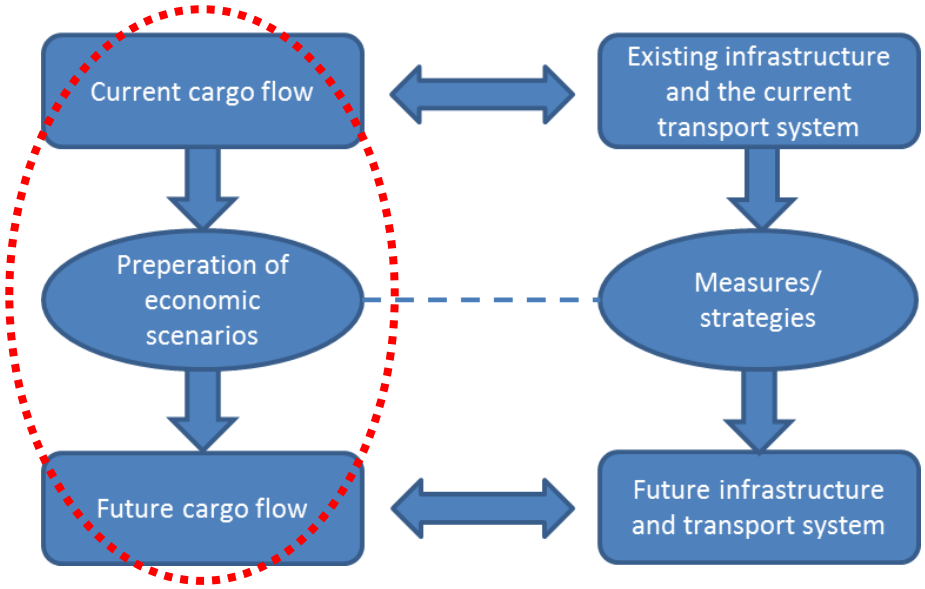


Figure 9 – Relations between PHE components

This is a simplified diagram of the relations between the current and future situations on one hand and demand for transport (cargo and passenger flows) and infrastructure and the transport system on the other hand. In the following paragraphs, the processes to be adopted for analyzing the current cargo and passenger flow, the development of social and economic scenarios, and the definition of future cargo and passenger flows are described.

3.3.5.2 Current cargo and passenger flow

The goal of this activity is to present the transport flows and the factors related to them. The demand for inland waterway transport is derived from the production of goods. And it is important to map the flows. That is, the origin and destination (O-D) of the commodities transported should be determined and identified (soybeans, iron ore, building materials), as well as passenger flows, information on modal share, seasonality of the cargo and how it (solid and liquid bulk, container and general cargo) is transported.

For this activity, the transport network and the O-D matrix of the 2012 PNLT should be used, as well as logistic costs of the modalities, import and export data of the Aliceweb system, current studies and information coming from interviews.

The costs of the transport modalities will be gathered from the literature, interviews and available models. For a series of commodities, detailed information is available (for example, transport of soybeans to ports by truck). For others, the information is less detailed, but sufficient for calculating the benefits (for example, costs per kilometer for railway transport). Cost information will be organized in an Excel database.

Transport costs are partly fixed (regardless of the kilometers traveled) and partly variable. The most important fixed costs are those concerning driver/crew, capital, taxes, insurance and depreciation. Variable costs are, for instance, fuel, tolls and maintenance. In addition, costs related to waiting and transshipment are also relevant.

Transport costs can be available in a simplified way or presented as an average cost per ton-kilometer.

From this information, the selection of products will be done jointly with the MT team, in order to focus the development of the work on the most promising flows.

In addition, the area of influence will also be defined for the base year per river basin, based on the current data of the Aliceweb system, which has a database with information on the origin of exports from Brazilian ports. Because most waterway transport is oriented toward export, this source provides a good indication of the area of influence of the river basin.

Thus, the modal share of the waterway transportation in the transport matrix will be determined based on the allocation of the flows of the different modalities, by minimum cost.

3.3.5.3 Economic development and future cargo and passenger flows

Like in the prior activity (current flow of cargo and passengers), the O-D matrix of the 2012 PNLT, where economic scenarios were already considered in the analysis, will be used to determine the future flow of commodities, as well as the investments foreseen for infrastructure. In addition to the PNLT, PAC 1 and PAC 2 will be used as a base for the future transport network, whose project horizons will be the periods previously defined (short, medium and long term). After the infrastructure scenarios are defined, they shall be approved by the MT.

The future areas of influence for the basins will also be established and the IWT modal share of the transport matrix, using the same methodology proposed in the previous paragraph. It must be emphasized that, as a function of new infrastructure, new routes and transport chains may be generated.

Only investments already planned will be considered in this step; new measures or strategies destined to increase the IWT modal share will be developed in the next step (D).

The modal share of inland waterways per commodity and per O-D may then be established. In the last step, when establishing a reference projection, we will check whether any change in the type of vessel can be foreseen to facilitate the transport of the tonnage estimated in the previous activities. It is quite possible that other kinds of vessels may be necessary because of other types of commodities (soy oil and meal instead of soybeans).

With regard to passengers, we will make a reference projection based on the expected changes in population in the relevant areas as compared to the current situation.

Summary of information needed:

- Current and future economic demand
- Cargo flows (quantity, type and distances)
- Dams, ship locks, river ports and mooring sites
- Link with other transport modalities
- Existing PPP – Public Private Partnerships and their financial aspects
- Budget of the Ministry and stakeholders
- Socio-economic scenario

Sub-Result: Report on current and future economic flow of cargo and passengers

3.3.6 Analysis of the physical river system, environment and social aspects

A good understanding of the physical river system in which the waterways are located is essential to understand the current infrastructure and transport system. Furthermore, it provides an insight into which improvements can be made.

Moreover, the analysis of social and environmental issues in the river basins is important to structure the understanding of the physical, biotic and socioeconomic conditions for each basin by means of a set of relevant secondary data.

This analysis aims at understanding the social and environmental characteristics, and the ecosystems that form them, organize the landscape and provide natural resources and environmental services, as well as the socioeconomic dynamics that determine the various forms of appropriation of such resources and services.

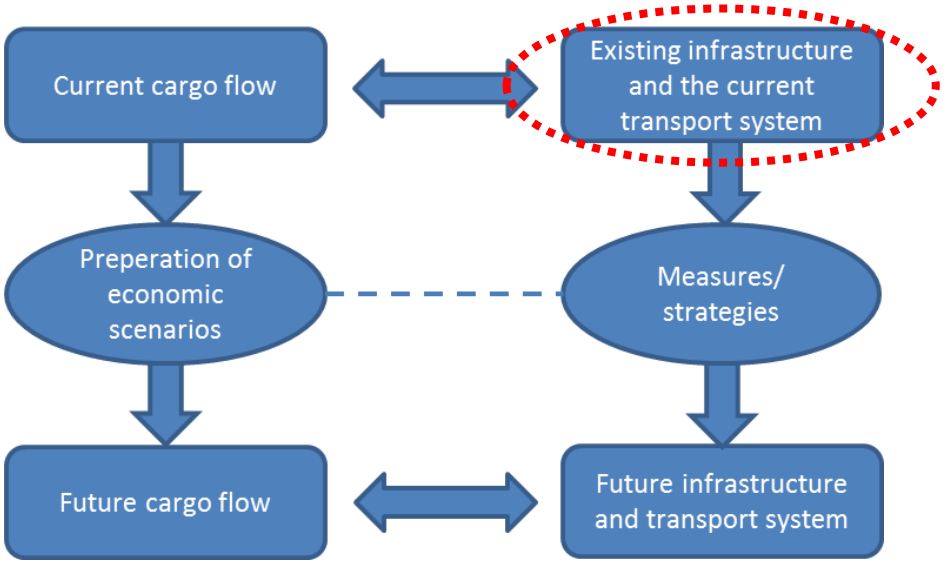


Figure 10 – Relations between PHE components Current infrastructure and transport system

Summary of information needed:

- Geographic, geometric, hydraulic, hydrologic and morphologic data per river basin
- River bed evolution/ annual sediment transport, dredging data (maintenance of navigation channel)
- Water level and discharge regime
- Climate change
- Possible interventions to improve the waterway for IWT
- Flow velocities
- Dams, ship locks, river ports and mooring sites
- Environmental characteristics
  - Conservation units
  - Land use and vegetation
  - Conservation areas
  - Deforestation rate
  - Mining sites
- Social characteristics
  - Indigenous territories
  - Fisherman colonies
  - Rural settlements
  - Maroon (Quilombo) communities
  - FIRJAN – Municipal development index

3.3.6.1 Goal

The goal for the analysis of the current situation of the river basins in Brazil will be to identify the characteristics of the river regions, including the major bottlenecks and problems. The chart below states the research elements for the analysis of the river basins.

Within a river basin all hydrological processes take place: flood waves propagate, discharge regimes can change over time, the river morphology can be influenced by upstream and downstream developments, water is extracted for urban and agricultural use and water quality strongly depends on what happens upstream. All of these processes can only be understood and quantified within the comprehensive context of the river basin.

The analysis of social and environmental issues using secondary data, with the river basin as a model, is important for structuring and understanding the physical, biotical and socioeconomic conditions. This analysis aims at understanding the social and environmental characteristics of the river basins. Along with the ecosystems that form them, organize the landscape and provide natural resources and environmental services, as well as the socioeconomic dynamics that determine the various forms of appropriation of such resources and services.

Within the Brazilian federal boundaries, twelve river basins have been defined (see Figure 2).

The largest river basin is the Amazon basin (Figure 11). It is even larger than shown in the figure below, since its extension partially covers Guyana, Venezuela, Colombia, Ecuador, Peru and Bolivia. Other basins – the Paraná, Paraguai and Uruguai – cover countries like Paraguay, Bolivia, Argentina and Uruguay.

The hydrographical borders between river basins differ from state borders and national borders. Therefore, integrated water management cannot be fully effective if it is organized on a state or even national level. The Brazilian Water Law defines River Basin Committees, which are responsible for water management of their basins. They are subordinate to the Ministry of the Environment. For the international river basins, there are treaties with neighboring countries.

Figure 11 – The international Amazon basin (source: World Geography, 2010)

The navigability of a waterway can be positively or negatively influenced by any development within its river basin. Discharge regimes can change due to climate change, hydropower dams and increased water extraction. Urban development can cause higher extraction (i.e. lower base discharges) and higher flood discharges as well. All of this can influence flow velocities and water depths and, consequently, the navigability of the waterways. For this reason, an analysis of the river basins must always precede the analysis of the waterways.

3.3.6.2 Result

At this stage of the project it is necessary to obtain an overview of all relevant data available:

Physical river system, environment and social aspects:

- Surface of the basin (partial surface on Brazilian territory, if applicable);
- Average yearly rainfall in the basin (optionally divided into sub-basins);

- Effective run-off coefficient (percentage of rainfall that reaches the river);
- Expected trends based on the parameters calculated due to future developments.
- Ecological-Economical Macrostorage of the Legal Amazon and of other states (according to availability);
- FIRJAN index of municipal development;
- Indigenous territory, fisherman colonies, rural settlements, maroon communities;
- Vegetal coverage and land use;
- Conservation units, priority areas for biodiversity conservation;
- Deforestation rate;
- Mining processes.

Main rivers:

- Current discharge regime (average discharge, distribution during the year, known flood discharges, design discharge, if applicable, low discharges, discharge probabilities);
- Water levels, flow discharge;
- Monitoring station locations and historical discharge data;
- Annual sediment transport, morphological trends of the riverbed, historical dredging data;
- Accessibility of the waterways for vessels (depending on class or size)
- Current bottlenecks for existing navigation classes (if applicable);
- Current bottlenecks for an upgrade of the navigation classes;
- Objects in the infrastructure like dams, dikes, ship locks, obstacles, river ports, mooring sites (both existing and planned objects);
- Expected trends in these parameters due to future developments.

The identification of bottlenecks is crucial for the preparation of scenarios (see Section 4.4) and therefore they must be inventoried. There can be various bottlenecks for navigation:

- Low water depths;[1]
- Narrow river channel;
- Unstable navigation channel due to morphodynamics;
- High flow velocities;[3]
- Natural or artificial physical barriers (waterfalls, rapids, hydropower dams);

[1] Hydraulics depend on variables such as the water level and stream discharge, statistically distributed over the years

- Limiting infrastructure (dikes, small ship locks, low bridges);[3]
- Lack of river ports near economic centers;
- Lack of facilities like resting harbors, fuel stations and mooring sites, that make it impossible to travel long distances;
- Lack of skilled skippers and navigation education centers.
- Possible conflicts with traditional communities (indigenous territory, fisherman colonies, maroon communities), INCRA rural settlements and/or areas of conservation interest.

Table 6 provides a preliminary list of the river basins to be visited and studied, their most relevant or promising waterway corridors and their approximate extensions.

Table 6 – River basins, rivers and navigable extensions

Basin	Navigable rivers – Waterway corridors	Main rivers	Navigable extension (km)
Amazonas	Amazonas-Solimões	- Amazonas	1500
		- Solimões	1620
		- Negro	310
		- Branco	400
		- Purus	2450
		- Jari	110
		- Trombetas	-
	Juruena/Tapajós/Teles Pires	- Juruena	
		- Tapajós	850
		- Teles-Pires	190
	Madeira	- Madeira	
Tocantins-Araguaia	Tocantins-Araguaia	- Tocantins	560
		- Rio das Mortes	580
		- Araguaia	1230
Parnaíba	Parnaíba	- Parnaíba	1240
São Francisco	São Francisco	- São Francisco	1370
Paraguai	Paraguai	- Paraguai	3440 (1280 on Brazilian territory)
Paraná	Tietê-Paraná	- Paraná	2400
		- Tietê	
Atlântico Sul	Hidrovias do Sul	- Jacuí	230
		- Taquari	90
		- Lagoa dos Patos	260

The result of this inventory will be a systematic documentation of Brazilian rivers and channels, as well as tables, charts and maps.

3.3.6.3 Method

- Hydrological, meteorological, hydraulic and morphological data, as well as anticipated climate change effects will be gathered from official sources and existing studies.

- Maps of Brazilian rivers and waterways are already available and will be used during the consultation of stakeholders such as the River Basin Committees and the waterways authorities, among others. The counterparts will be asked to indicate and provide explanations on existing and future bottlenecks, relevant objects, desired extensions of navigable waterways, and other relevant data on these maps.

- The project team will create map books (at least one for each river basin), showing the current waterway navigability expressed in vessel classes and including bottlenecks. The maps will show hydraulic objects of all kinds, accompanied by index numbers. Detailed information will be presented in a document attached to the reports to be produced.

The preparation of the maps will be an extensive GIS activity (Geographic Information System), and will be compatible with the system database and information from the Ministry of Transport. A map book for each river basin will show all relevant elements of the basins, the waterways and the main rivers and canais, in thematic layers as listed on the previous page. The report will present the hydrological, hydraulic and morphological analyses. The map books will be important assets to support the rest of the project, where a characterization of waterways will be presented. Figure 12 shows an overview of Brazilian waterways.

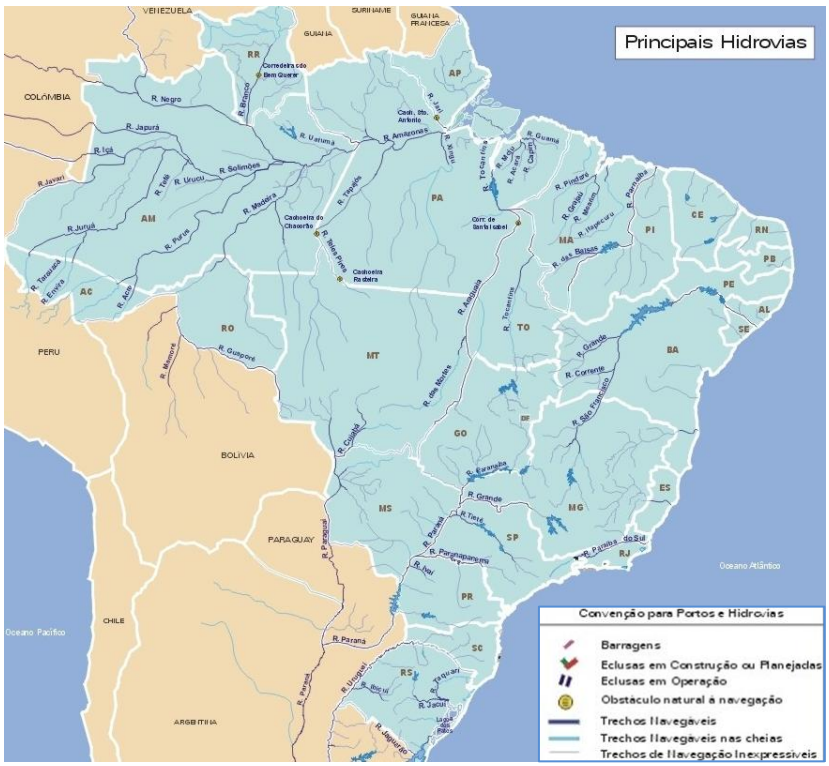


Figure 12 – Waterways in Brazil (source: Ministry of Transportation, 2008)

3.3.6.3.1 Compilation of Data and Analyses of the Documents

Studies and official cartographic bases will be prepared, in appropriate scales, with data and background information for the social and environmental analysis of each basin. The main research sources are the:

- Federation of Industries of the State of Rio de Janeiro (Federação das Indústrias do Estado do Rio de Janeiro – FIRJAN)
- National Indian Foundation (Fundação Nacional do Índio – FUNAI)
- National Institute for Colonization and Agrarian Reform (Instituto Nacional de Colonização e Reforma Agrária – INCRA)
- Ministry of the Environment (Ministério do Meio Ambiente – MMA)
- Chico Mendes Institute for Biodiversity Conservation (Instituto Chico Mendes de Conservação da Biodiversidade – ICMBio)
- National Department of Mineral Production (Departamento Nacional de Produção Mineral – DNPM).

Finally, these data will be incorporated into a georeferenced database that will support the several analyses addressed by the study, as well as the preparation of thematic maps developed for the Inland Waterway Transportation (IWT) system.

3.3.6.3.2 Analysis of criticality

The analysis of social and environmental criticalities will be made by overlaying existing thematic charts showing attributes with different frailty/potentiality levels. There may be three (low, medium and high) or more levels and they will be defined during the analysis process. The variables to be analyzed encompass some of the variables that will be discussed for contextualization of the already mentioned river basins. Those worth highlighting are plant cover and land use, biome, conservation units, APCBs, mining grants, deforested areas, indigenous lands, maroon communities, INCRA settlements and fisherman colonies. For the purpose of the analysis of critical points, they will be analyzed, weighted and presented in order to map areas that are critical for the environmental licensing process of future support structures for the implementation and maintenance of waterways.

Thus, the goal is to identify territorial spaces in which the physiographic, ecological and/or socioeconomic characteristics determine different levels (or classes) of criticality for implementation of the waterway. The figure below shows two examples of analysis of the cumulative criticality and weighted arithmetic criticality:

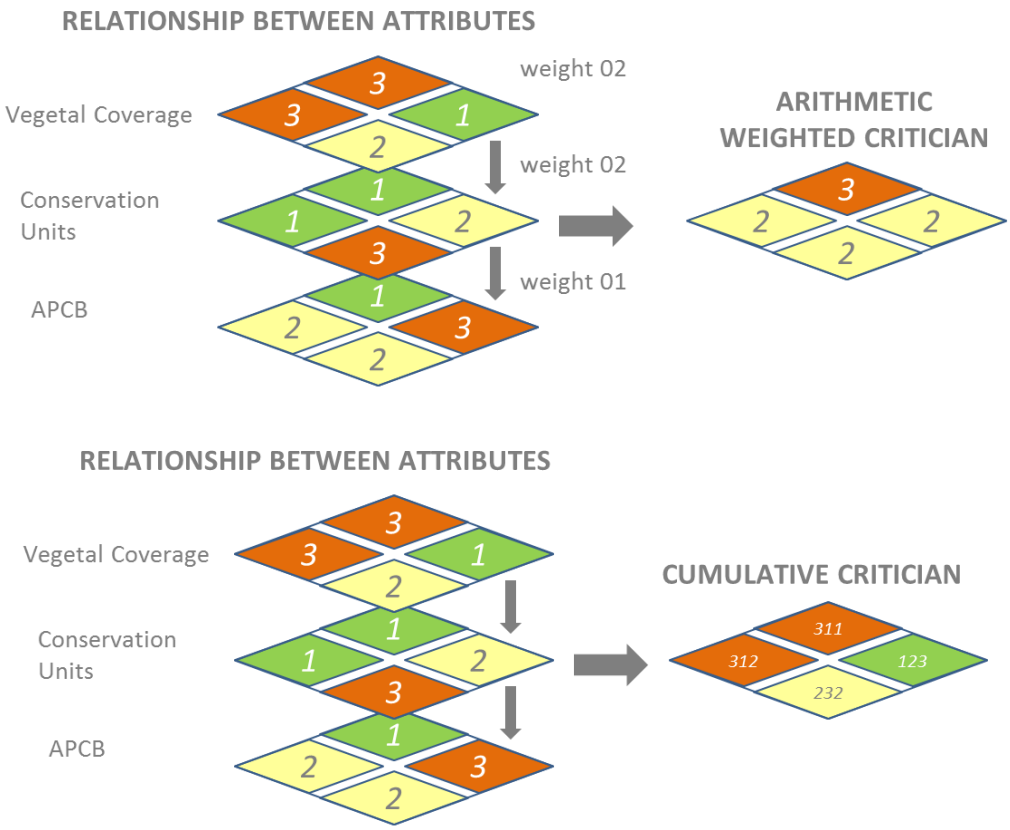


Figure 13 – Examples of Critician Analysis (Cumulative and Arithmetic)

To this end we will use a Geographical Information System (GIS), an important tool for the integration of data and variables aiding in the integrated assessment.

The steps presuppose the preparation of criticality matrices and social and environmental criticality charts per basin. The characterization of basins will be performed based on this material and other information generated in the diagnostic phase, highlighting weaknesses and potentialities that will be input for the SWOT analysis that will be prepared later.

Sub-Result: Map books with all relevant elements of the basins

3.3.7 Analysis of the transport system

To stimulate the inland waterway transport system and make it more competitive, it is necessary to fully understand the current infrastructure and transport system.

3.3.7.1 Goal

A competitive transport system can be characterized by:

- High reliability and low risk
- Good access to the market;
- Low operating costs;
- Competitiveness with other modalities.

In this paragraph we explain how and what will be investigated to get information on the current status of inland waterway transport in Brazil. We will investigate whether more than four 'aspects for success' are being fulfilled or where improvements are needed.

3.3.7.2 Result

Research will be conducted to understand the Brazilian infrastructure and transport system. The following information is needed:

Transport

- Inland cargo and passenger transport: What types of cargo (including passengers) are currently transported? Considering passenger transport, what is the reason for the trip? What is the origin and the destination of the cargo? In this step all modalities of transport will be investigated to see opportunities for a modal shift to waterway transport.

- Companies using the waterway modality and its potential: What companies use this modality? Are they mainly public or private companies? For what purpose (crossing, passengers, cargo)? Are there any government programs or development trends that may influence the use of this modality? For example, is growth of tourism expected? In this phase of the work, which is linked to the phase of economic and financial aspects, a survey will be conducted for possible developments and policies affecting stakeholders and experts in the sector.

- Connection with the other modalities: The connections between waterway transport and the other modalities need to be mapped in order to identify competitors and complementary modalities, so as to assess the possibility of modality change;

- Charges: For the river basins it is important to know what facilities are available for navigation and what costs are involved. What is charged at locks and ports, what are the costs of fuels, etc. This allows us to compare waterway transport with other modalities.

River infrastructure and current fleet capacity

- Characteristics of ships, terminals and facilities: This research is necessary to know more about the capacity of the current transport system and where it should be optimized, in terms of capacity, locations, connections with other modalities, etc.

- Structure of the inland waterway transport sector per basin: In addition to the physical constraints, navigation restrictions also need to be mapped, such as night navigation, navigation lights, etc.

- Nautical circumstances: The analysis of the physical river system will provide data in this field. This information needs to be analyzed to determine whether the rivers are navigable and for what ships. For example, river depths will be analyzed in the previous paragraph, and now an interpretation will be made to learn what ships will be able to navigate at those depths.

Regulations

Regulations with regard to crewing and safety are particularly important for transport. There is also a strong link with the analyses of governance and institutions (next paragraph). Other policies and regulations influencing the possibilities of inland navigation, such as the type of fuel used and control of pollutant emissions, will be reviewed as well.

We will analyze the specific regulations with regard to these subjects and, in addition to checking whether they are helpful or harmful to achieve the goals, we will compare them to international standards.

3.3.7.3 Method

Information will be gathered from the literature and interviews with (local) experts. These interviews are very important since it will be difficult to gather relevant data from throughout Brazil. Due to the size of the country, it is important to prioritize the most important information and focus on it.

Summary of information needed:

- Inland cargo and passenger transport (amounts, type, distance)
- Current and future types of transport companies using IWT (industry, tourism, public, private)
- Current fleet capacity and river classification system
- Characteristics of ships, terminals and facilities
- Nautical circumstances
- Link with other transport modalities
- Current capacity and possible developments of other transport modalities (railway, road)
- Safety regulations for the IWT of transport/cargo
- Organization of and responsibilities in the transport system

The relevant data will be put into a geographical database as much as possible. By doing so, it will be easier to analyze the different river basins. This will be done by overlaying maps. It is important to visualize the information as it is very difficult to analyze geographical data from texts or tables. For example: relations between different modalities will become visible or relations between suitability of rivers for navigation and current transport cargo (by all modalities).

Another type of analysis to be made will be to compare the Brazilian situation with the situation in the U.S. and Europe. The European experts on our team will know from experience what potential there will be for improvements and what situations are threats to development.

Analysis of measures

Measures are determined from the information obtained from the consultations and from the SWOT analysis (see below).

However, to be prepared from a transport point of view, a short list of possible interventions (and their feasibility) to improve the IWT system will be verified.

3.3.8 Analysis of governance and institutions

In order to facilitate the implementation of waterways in Brazil, it is important to map and understand the institutional framework involved in the process.

3.3.8.1 Goal

This analysis aims at identifying both the process and the institutions involved in implementing a waterway system, in order to initially make clear how governance is currently organized around the water transport issue in Brazil. For this reason, it is important to identify the institutional framework, mapping responsibilities and attributions in government institutions that are involved throughout the process of implementing or operating a waterway. In addition, it is important to detail the legal framework related to the environmental licensing process, both for infrastructure works and the waterway itself.

3.3.8.2 Results

Through a framework that enables an understanding of the process and shows institutional/governmental participants engaged in the process, we will be able to highlight potential bottlenecks that could complicate implementation and operation of waterways.

The framework will also enable a comparison between the practice in Brazil and some international experiences that may provide some perspectives to positively influence the process as it has been done over the last years. In this sense, it is worth emphasizing that, although the focus of this step of the study is mainly on government institutions and governance of waterway transportation at the national level, the forums where international management take place will also be identified. This is because Brazil has important rivers on its border (Prata Basin and Amazon Basin). Therefore, we will analyze the management of international waterways, but only to clearly identify the framework and governance practiced by the Brazilian government. International agencies will be identified and characterized when they are interlocutors with Brazilian institutional representatives for the management of international rivers, but they are not the main scope of this study.

In terms of the legal framework associated with the waterway issue in Brazil, it is relevant to discuss the licensing process in the country. With regard to the environmental license, it is required for construction that may pollute or "consume" natural resources. This type of support construction needs an environmental permit, as does the construction of ports, which has some other characteristics that need to be taken into account. Experience from abroad will also be useful for understanding potentialities and weaknesses that may be considered to facilitate the licensing process.

3.3.8.3 Method

To organize the legal framework, the national environmental legislation (6,938/ 1981) will be the starting point, complemented by specific local legislation and practical knowledge regarding the licensing process. To gather this information, in addition to the ARCADIS Consortium's experience, available legal resources will be consulted and analyzed.

In general terms, the licensing process follows the flow presented below:

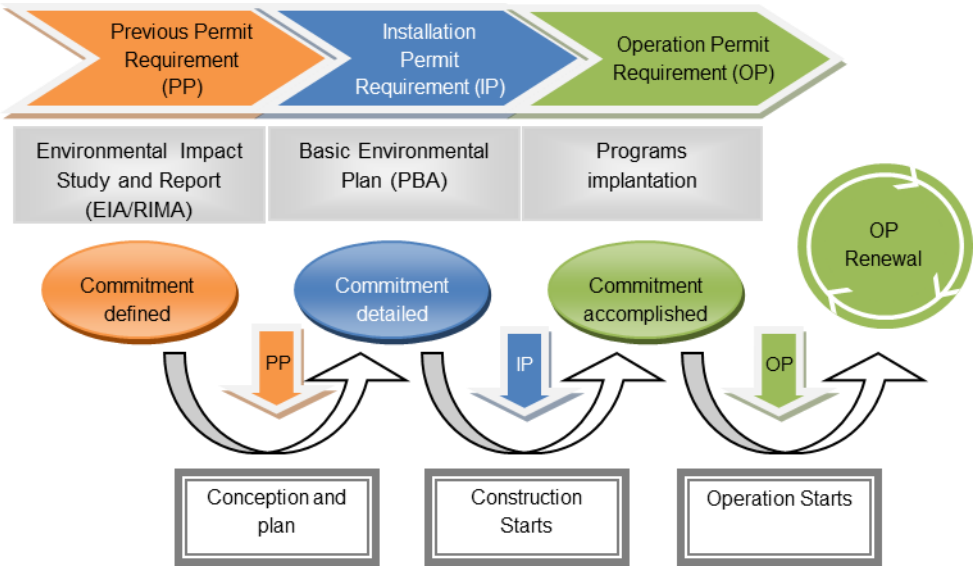


Figure 14 – The environmental licensing process

As for the institutional framework, available literature, institutional websites and administrative documents will be consulted and analyzed. Some specific interviews may be conducted, if necessary, with people who may help explain the process and the information flow. It is important to first map the institutions that play a central role in the process related to implementing a waterway and then map and disclose its connections and how information flows between them.

Summary of information needed/results:

- Characteristics of governance system (national policy)
- Juridical framework
- Environmental legislation
- Licensing (Crewing regulations, night navigation, navigation restrictions, et cetera)
- Transport legislation (freight/cargo transport, passenger transport, et cetera)
- River legislation (flood protection, ecological maintenance, permit system, floodplain boundaries)
- International context (treaties)
- Nautical circumstances and river regulations for the relevant stretches
- Comments from stakeholders
- Waterway management system
- Regulations – overview (current development)

3.3.9 SWOT analysis and formulation of measures

A SWOT analysis is a strategic planning method used to evaluate Strengths, Weaknesses, Opportunities and Threats. In this case it will be a SWOT analysis based on the information gathered about the physical river system/environment/social aspects, the transport system, governance and institutions, together with the economic and financial aspects.

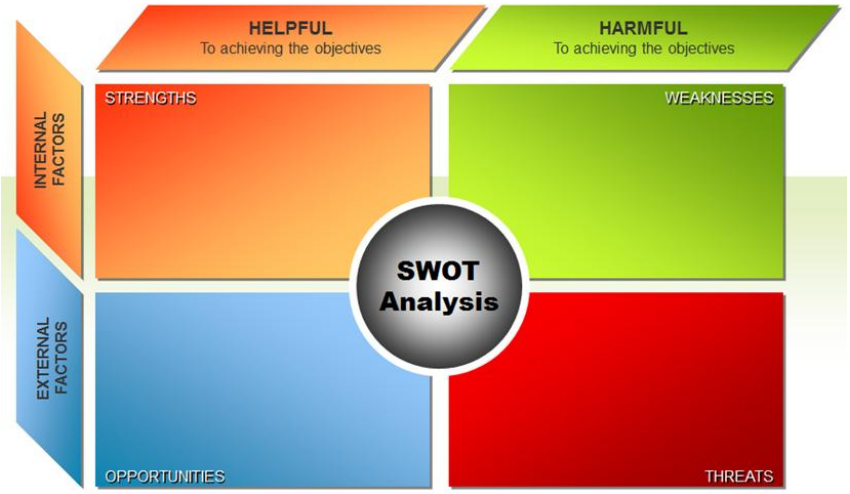


Figure 15 – The SWOT analysis process

The SWOT analysis will provide a detailed understanding of the potential of the river basins and will be the foundation to come up for developing potential measures. These measures will be considered together with those generated during the consultations.

ARCADIS will organize a "week of discussions." This will be an internal activity, but during this week several external experts will be consulted.

Meeting 4: Discussing the analysis of current situation and preparing for "SWOT"

Sub-Result: Draft report on analysis of the current situation

The program of the week will be:

Day 1: Presenting results to the whole team from the detailed analyses of the physical river system/environmental/social aspects, transport system, and management process, together with the economic and financial aspects, for each river basin.

Day 2: Summarizing the results of the analysis of Strengths, Weaknesses, Opportunities, and Threats of each river basin. The same will be done on a national level. Here some generic aspects influencing navigation will be addressed.

Day 3: Analyzing each of the river basins. All of them need to be analyzed and scores based on their potential. This will enable focusing on the final strategy. There is no point in developing a strategy for every Brazilian river. It is better to focus on rivers and areas that show potential. Thus, a better, tailor-made strategy can be developed. Scoring a river basin (or part of it) can, for example, be done as shown in the table below. Prioritizing can be done based on the total

score, enabling focus of the research. The scoring criteria will be discussed with experts and the MT.

Table 7 – Example of river basin scoring

River Basin	Criteria A	Criteria B	Criteria C	Total score
A	+	--	+/-	-
B	++	+	+	++
C	-	+	+/-	0
Etc.				

On day 3 we will also start focusing on the national potential to prepare a consistent strategy. The potential of each river basin has to be supported by the national strategy. Besides that, the transport and management system, together with the economic and financial aspects, do not stop at the borders of a river basin.

Day 4: This day will be used for small groups to observe and analyze the information gathered.

Day 5: On day 5 a long list of possible measures to develop waterway transport in Brazil will be prepared. A long list was prepared during the consultations, but in this step our experts will add to it based on the SWOT analysis. Once all the mechanisms influencing waterway transport in Brazil are understood, it will be possible to discuss the full range of possible measures.

After the full range of measures has been produced, the team will start comparing the different measures. The measures usually come from stakeholders or experts in one of the four pillars. In discussions with the other 3 pillars, the feasibility of the measures will be compared. Looking at measures from different perspectives will help ensure that the best ones are selected. The end of this step is a list of priorities which will be used in preparing the strategies.

At the end of the week, a final report of the detailed assessment containing a diagnosis will be drafted.

Meeting 5: Report with comments on the in depth assessment and diagnosis

Sub-Result: Report on assessment and diagnosis

3.4 DEVELOPMENT OF STRATEGIES

The main step of the project is the preparation and evaluation of strategies and it will be developed based on the diagnosis (Step C) and the stakeholder consultations (Step B).

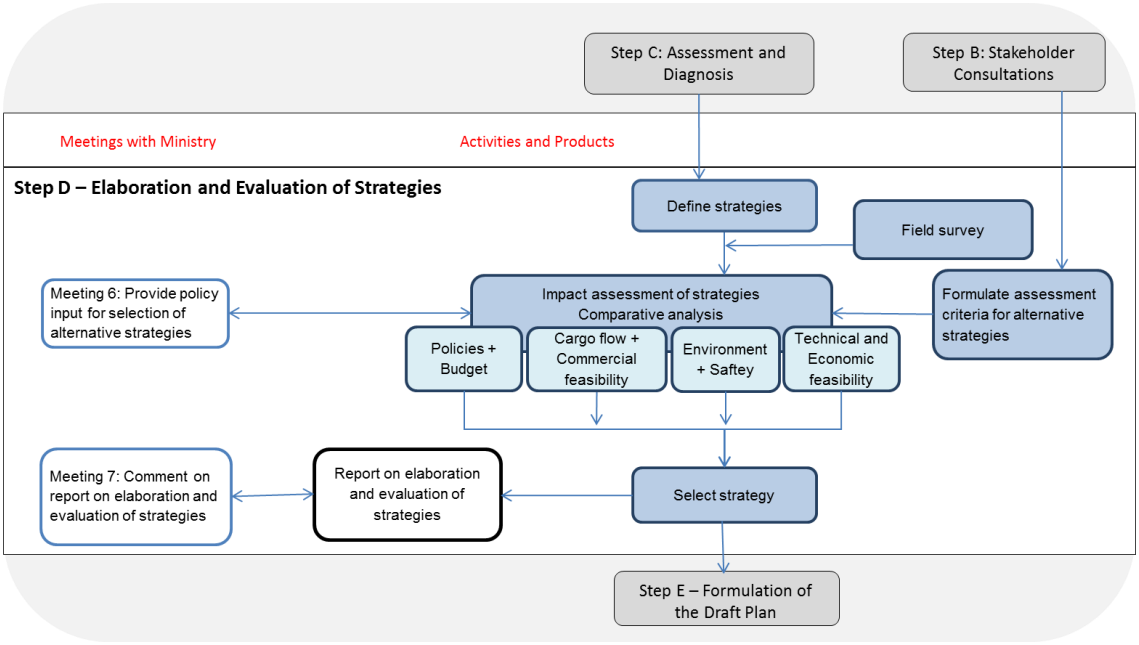


Figure 16 – The Working Process: Step D

In the context of this plan, a strategy is a set of measures, projects or activities aimed at reaching a specific goal. The measures are diverse and can include: building a lock, changing the licensing system, creating fiscal incentives or starting a campaign to encourage the use of this modality. To facilitate implementation and monitoring, the measures will be grouped according to the objectives related to them.

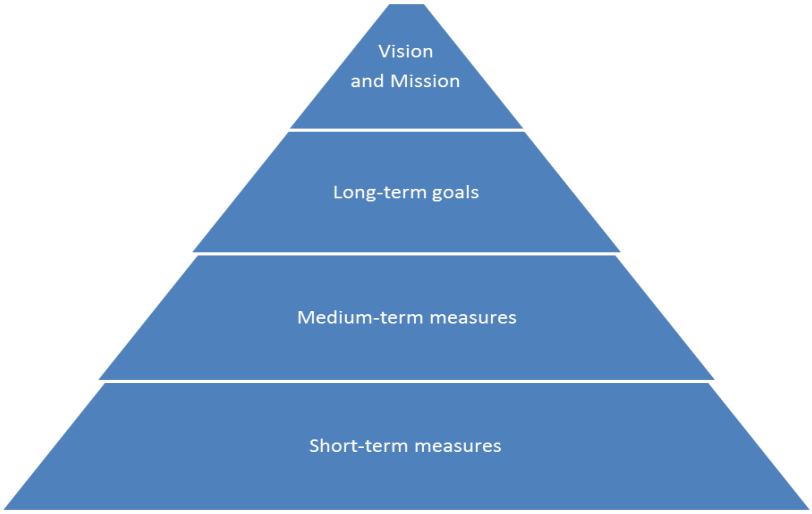


Figure 17 – The process for preparing the strategies

The development of strategies can be carried out by two methodologies: bottom-up or top-down. Both will be used in this project in a combined approach. Initially, bottom-up will be applied to identify the needs and ideas for key improvement in the river system and national policy. The SWOT analysis and the stakeholder consultations will enable identification of the major strengths and weaknesses to be improved, opportunities that can be taken advantage of and threats to be avoided.

Defining the strategy will start with the top-down approach. First, experts will determine a realistic goal for the long term, which, a priori, will be that of the PNLT. Two or three different strategies with different focuses will arise from the various objectives or sub-goals defined. The expert team will develop several objectives that we can set to reach the main goal. For example, increasing the navigability of one or more river basins, implementing a more structured transport system or simplifying legislation on topics Z and Y. The measures will be grouped together into the goals to which they contribute.

3.4.1 Elaboration and evaluation of strategies.

The strategies will be prepared and evaluated under different focuses, comparing them with the reference situation defined in Step C.

As previously mentioned, measures will be defined based on the SWOT analysis and with the product of Step C. The set of measures will correspond to strategies and the proper methodology for their development will be indicated as follows.

Defining strategies that will influence navigation aspects, such as reducing cost per ton of inland navigation by improving navigability, will have an impact the choice of modality. Connecting waterways (if this is at all possible) could have an impact on port choice. Most measures will presumably have an impact on modal choice.

In addition, these strategies are evaluated (through a comparative analysis) on their impacts generated by implementation of new policies, as well their impacts on the environment, safety and commercial, technical and economic feasibility.

A new demand forecast will be made for the latter, with the inclusion of defined measures/strategies, establishing the new IWT modal share in the transport matrix. Since different strategies will be created, there will be project alternatives.

These will be compared with the baseline alternative, according to the Cost-Benefit (C/B) analysis, which will include:

a) The cost of the investment to improve the waterway, including maintenance and operation costs during the entire time period, as well as the financial instruments that can be applied to compensate the costs.

b) The most important benefits come from changing the transport flows to the waterways. In addition, in some cases new transport flows will arise from the investments. These induced flows are very small in countries with a highly developed infrastructure. In Brazil, it is likely that the infrastructure improvements (and other measures to facilitate transport) will lead to reduced logistic costs and increased transport. The benefits of this change of modality and increased transport will be calculated based on the transport costs of the relevant modalities for the entire time period.

c) Besides direct transport costs, inland navigable waterways positively impact non-measurable costs (safety – accidents, victims, emissions and noise). The calculation will be based on the difference in kilometers traveled.

It must be emphasized that when defining strategies, the conditions under which companies (producers, shippers, transport operators, etc.) change their modus operandi and start using IWT will be considered. These conditions, as well as the criteria to be used when choosing alternatives, will be discussed with the companies during the stakeholder consultation phase and they will be incorporated into the diagnosis (Step C) as potential improvements.

Meeting 6: *Provide policy input for the selection of alternative strategies*

3.4.2 Field recognition

The goal of field recognition is to gauge the data obtained in the rivers/waterways, identified at the beginning of *Step D: Elaboration and analysis of Strategies,* as having great potential for the implementation of waterways.

When the strategies are defined, the major waterways will be identified and with these as a reference, five river sections will be selected for field study. Field study should take place during the flood season, since many river sections being studied have navigation restrictions during the dry season. Field studies may be conducted by accompanying trips made by shippers or small vessels made available for this purpose, whichever is more relevant for the section to be visited.

In the field, the Arcadis technical team will check whether the data and information gathered match reality and will complement the database already prepared. The study will allow us, to the extent possible, to learn about and qualify the peculiarities of the river segments that are relevant to the work by identifying the support infrastructure and possible bottlenecks to navigation. Information will be recorded on the location of rapids, waterfalls, and mooring places, among others, by using GPS and cameras.

Field recognition tasks will be performed in parallel with the activities of Definition and Impact Assessment of Strategies. Due to time and resource limitations for performing this activity, we estimate that these study visits shall examine an extension equivalent to 5% of the waterways being studied, at the most.

3.4.3 Selection of the strategy

The previous preparation of combined strategies will show the effects of different strategies. The most advantageous one will be chosen and prepared. During a meeting with the Ministry of Transportation, we will check our findings and choices before we start drafting the plan report in the following phase.

Meeting 7: *Comment on the report on elaboration and evaluation of strategies*

Sub- Result: *Report on elaboration and evaluation of strategies*

3.4.4 Implementation of the strategy

The selected strategy needs to be transformed into an action plan. A time schedule will be developed for the set of measures, projects or activities. The set of measures will be grouped according to the implementation horizons, which will be: short, medium and long term.

Short time measures are those that are easier to implement, due, for instance, to the existence of resources already available for implementation, and also as a function of the favorable position of stakeholders towards them.

Medium term measures are those that cannot be readily implemented, as a function, for instance, of the need for alignment with stakeholders.

Long term measures, in turn, can take years to carry out, due to greater environmental impact or the need for substantial investments and incentives.

Thus, the plan will state the most advantageous strategy, as well as its development and implementation. A proposal for classification of waterways will be presented at this step, according to criteria of navigability and service levels.

3.4.5 Report preparation

The major items addressed in the plan will be:

- Strategy goals, benefits and scope
- An explanation of the research and information found (starting point)
- Preparation of the strategy: vision, objectives, international benchmarks, stakeholder consultation, the strategy itself and its actions (strategy implementation)
- The time schedule
- Plan monitoring
- Communication with stakeholders
- Plan evaluation

The plan index and draft version will be discussed with the technical team of the Ministry. A first overview, submitted to the Ministry, is included in the Appendices.

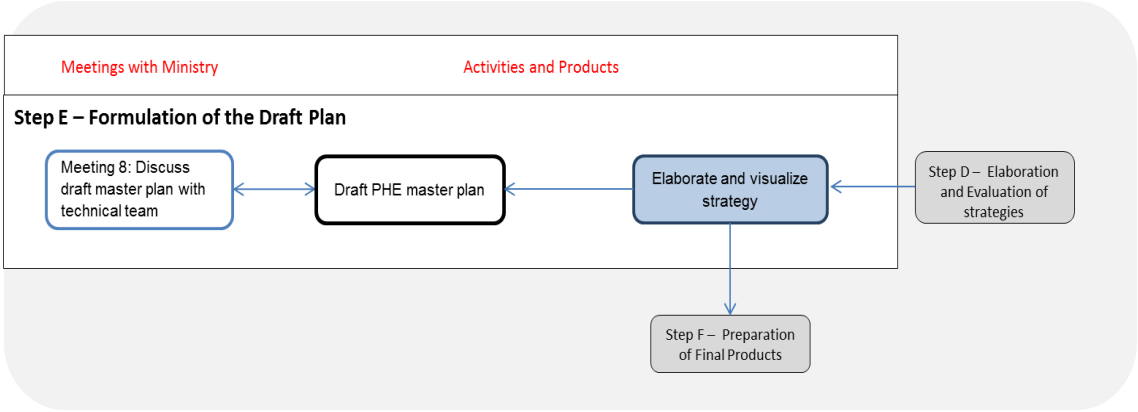


Figure 18 – The Work Process: Step E

Meeting 8: Discuss draft master plan with technical team

Sub-Result: Draft PHE master plan

3.4.6 Preparation of the investment plans

Another important step will be the preparation of an investment plan. It is necessary to know the financial implications of the future actions. This step will be carried out in parallel with preparation of the strategy, the action plan and the draft report.

3.5 FINALIZING THE REPORT

The draft plan will be reviewed by the technical team of the Ministry, external consultants of the Ministry and by consultants outside the Ministry. The final Waterway Strategic Plan will be written based on the comments and discussions.

After the plan is finalized, it will be submitted to the Ministry. The approach adopted and the measures to be taken for the waterway transport sector will be explained in this presentation.

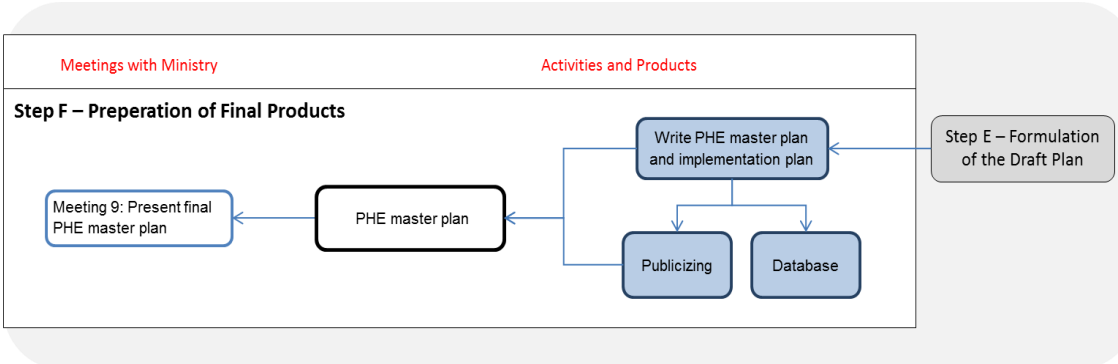


Figure 19 – The Work Process: Step F

3.5.1 Publishing and communication

During the process of strategy development, stakeholder consultation is very important, but not only in this step. At the end of the plan it is important to involve stakeholders in implementation of the strategy measures. To make it successful, their involvement is vital.

ARCADIS will then advise the Ministry on the best strategy to communicate the measures. The following aspects will be included:

- Objectives of the communication;
- Potential communication means, such as a website;
- Major stakeholders and their interests, as well as what the focus should be at the time the strategy measures are being implemented;
- Suggestions for the main message to be communicated;
- Suggestions for establishing a communication strategy, as well as a communication plan.

3.5.2 Database

During the project, a great variety of information will be gathered. Results of the diagnoses will be entered into an accessible database. The Ministry of Transportation already has its own Geographic Information System (GIS) for Transport. Additional information will be entered into a database compatible with this system. Within the four pillars a lot of information is geographical information. For example, physical information on the rivers in a GIS map, information on ports and terminals, trajectories/routes, traffic, duties, etc.

At the start of the project, the Ministry of Transportation needs to make the system characteristics available. This system will be updated with project information. In addition, experts will look at the system characteristics and evaluate it based on their European knowledge.

Meeting 9: *Present final PHE master plan*

Result: *PHE master plan*

4 TIME SCHEDULE AND PRODUCT DELIVERY

During the work, as defined in the contract, the following documents will be issued in the preliminary and final versions.

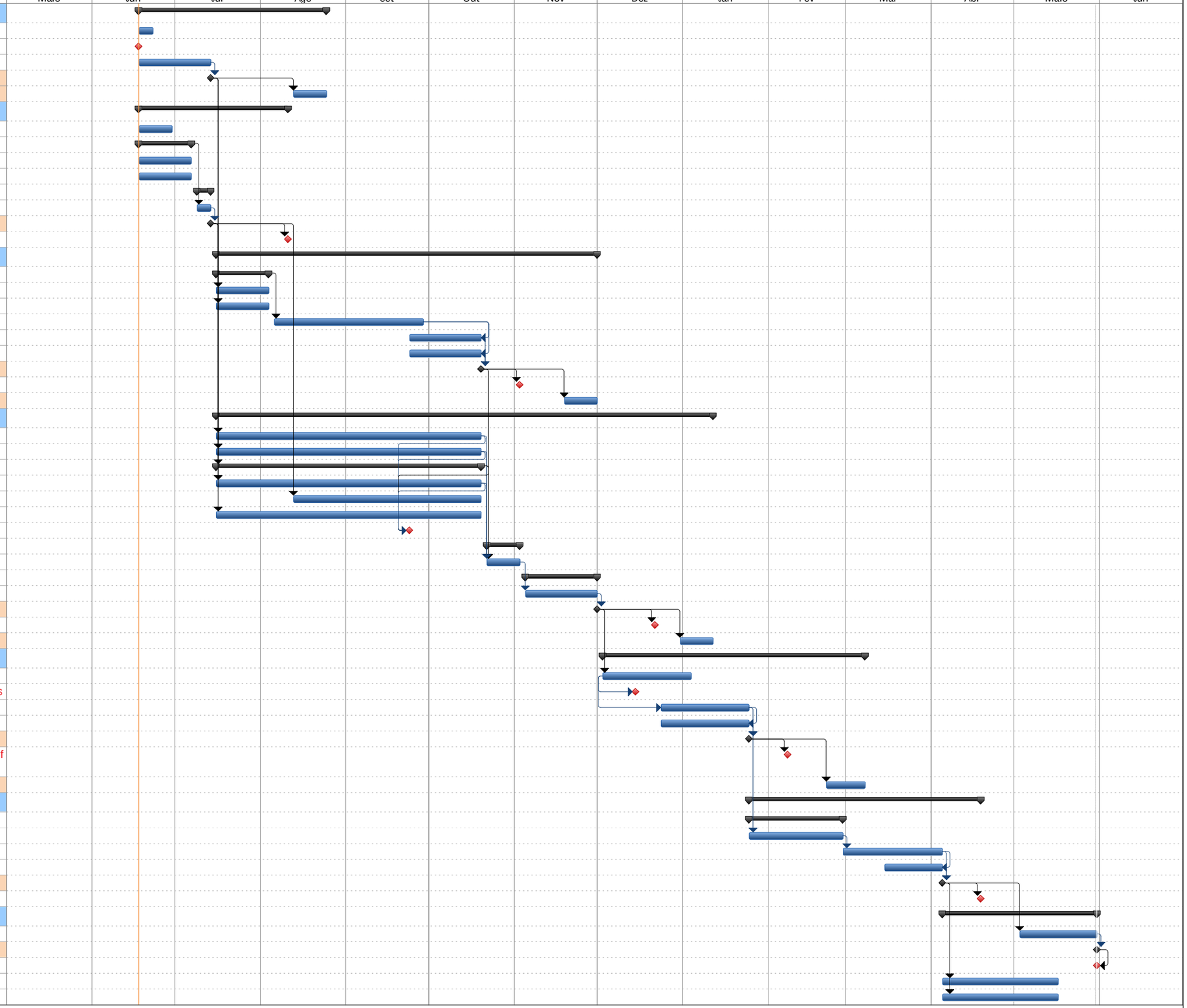
- Product 1 – Work Plan
- Product 2 – Stakeholder Consultations Report
- Product 3 – Assessment and Diagnosis Report
- Product 4 – Report on Elaboration and Evaluation of Strategies
- Product 5 – Draft PHE Master Plan
- Product 6 – PHE Master Plan

The six products will be issued to the Ministry of Transport primarily in electronic file format (Word and pdf files), in Portuguese and English language versions for analysis. Initially, the Portuguese-language version will be forwarded and, after one week, the English-language version will be delivered, or vice versa.

Remarks, possible changes and additions will be considered by the Consortium in its final version and if it disagrees, justifications will be added to the text of the report. After product review and approval, the Consortium will edit the final version in the Portuguese and English languages, and deliver five hard copies and the corresponding electronic files to the Ministry.

Below is shown the flow chart (PERT / CPM) and the Gantt chart, prepared with Microsoft Project software, illustrating the logical / temporal chain and the interdependencies between the different activities. The start date for the activities was set at July 18, 2012.

Nome da tarefa
1 ETAPA A: Plano de trabalho
1.1 Mobilization
1.2 Meeting 1: Project Start Up
1.3 Preparation of Work Plan
1.4 Draft workplan
1.5 Final workplan
2 Diagnóstico Preliminar
2.1 Data Collection
2.2 Determine priority rivers
2.2.1 Current demand and restrictions
2.2.2 Existing strategies and projects
2.3 Matrix to select priority rivers and subjects
2.3.1 Experts meeting
2.4 List of Priority rivers
2.5 Meeting 2: Discuss priorities
3 ETAPA B: Consultas Públicas
3.1 Organization
3.1.1 Actors to be questioned
3.1.2 Locations and planning
3.2 Execution of the Public Consultation
3.3 Compilation and analyses of results
3.4 Connection with the other elements/steps in the process
3.5 Draft public consultation report
3.6 Meeting 3: Comment on Report: Public Consultation
3.7 Final public consultation report
4 ETAPA C: Diagnóstico e Avaliação
4.1 Analysis of the river basins
4.2 Analysis of the transport system
4.3 Analysis of the institutions and governance
4.4 Analysis of the economic and financial aspects
4.5 Field Survey
4.6 Benchmarking with the European and American situation
4.7 Meeting 4: Confirm SWOT and analysis of current situation
4.8 SWOT Analyses
4.8.1 Experts meeting
4.9 Formulation of measures to be adopted
4.9.1 Experts meeting
4.10 Draft report on diagnosis and evaluation
4.11 Meeting 5: Comment report on diagnosis and evaluation
4.12 Final report on diagnosis and evaluation
5 ETAPA D: Elaboração de Estratégias
5.1 Definition of strategies
5.2 Meeting 6: Provide policy input for selection of alternative strategies
5.3 Analysis of the strategies´ impacts
5.4 Selection of the strategy
5.5 Draft strategies´ report
5.6 Meeting 7: Comment on Report on the elaboration and evaluation of strategies
5.7 Final strategies´ report
6 ETAPA E: Versão preliminar do PHE
6.1 Strategies for implementation
6.1.1 Action planning (short, medium and long term)
6.2 Preparation of investment plans
6.3 Advise on PHE Implementation
6.4 Draft Master Plan
6.5 Meeting 8: Discuss draft Master plan with technical team
7 ETAPA F: Versão final do PHE
7.1 Reviewing of the document
7.2 Final Report
7.3 Meeting 9: present the final Master plan
7.4 Publicizing and Communication
7.5 Database



5 ORGANIZATION AND TEAM/STAFF (QUALIFICATIONS)

The overall coordination of the preparation of the Waterways Strategic Plan is the responsibility of the geographer and port planning specialist, Alice Krekt, residing in the Netherlands, who will be supported in Brazil by the engineer, Maurizio Raffaelli, coordinator of the contract in Brazil, and the architect and urban planner, Adriana Vivan de Souza, who will support the coordination of the work carried out in Brazil and the Netherlands.

The expert team is divided into two complementary groups: one is composed of experts who live in Holland and the other of experts and professionals living in Brazil. The experts will be responsible for specific studies relevant to the four key areas of the work, namely:

- The physical river system, environment and social aspects
- The transport system
- Governance and institutions
- Economic and financial aspects

Professionals living in Brazil and the Netherlands form the support team that will participate in the work development and will support the activities of the experts and work coordination. The qualifications of the key members of the Support Team are described below.

Both the Brazilian team of experts, supervised by Maurizio Raffaelli, and the Dutch team, supervised by Alice Krekt, are multi-disciplinary groups of professionals and scholars. Their qualifications can be found in the Appendix. Figure 20 shows the overall project team.

5.1 COORDINATION AND EXPERT TEAM

- Alice Krekt: General Coordinator – Holland
- Maurizio Raffaelli: Contract Coordinator - Brazil
- Adriana Vivan de Souza: Coordination support

Physical river system, environment and social aspects

- Douwe Meijer: Expert in river hydraulics – Holland
- Joaquim Carlos Teixeira Riva: Expert in water transport and resources - Brazil

Transport system

- Jos Helmer: Expert in water transport – Holland
- Célio Luiz Verotti: Expert in waterway infrastructure - Brazil

Economic and financial aspects dimension

- Ben Smeenk: Expert in economics – Holland

Governance and institutions

- Cintia Philippi Salles: Environmental expert – Brazil
- Nanda `t Lam: Environmental expert – Holland
- Luciana Unis Coentro: Expert in public administration and government - Brazil

5.2 SUPPORT TEAM

Adriaan Berkhof: Adriaan has 12 years of work experience in spatial planning and water management projects. Adriaan worked for the Ministry of Infrastructure and Environment until 2005. Currently, Adriaan works for the Meuse program (with Douwe) on navigation issues concerning the planned upgrade to CEMT class Vb. In addition, Adriaan participates in river management programs for long term flood safety measures due to clime change.

Charlotte van der Vorm: Charlotte van der Vorm, M.Sc., is an expert in coastal and port works for ARCADIS. She has 13 years of work experience and is specialized in the design of coastal protection. Besides her expertise in coastal structures, she has experience in port layouts and studies, nautical studies, wave penetration and propagation, waterway design, geotechnical design and slope stability. She has designed structures over the years, i.e. the Port of Nador, Morocco, and several river projects in Holland. As a Young PIANC pioneer she initiated several activities for Young Professionals, part of the Dutch PIANC association.

Clarissa Grabert Neves Yebra: A civil engineer graduate of the Escola Politécnica of the University of São Paulo - POLI-USP, Feb/2009, she is working on a M.Sc. in Hydraulic Engineering (Ports and Waterways) at the Escola Poltécnica of the University of São Paulo - POLI-USP.

Cor Beenhakker: Cor has over 20 years of experience in projects in the field of Transport and Logistics. He works as a project manager, project leader and/or consultant/expert. His expertise includes a broad field of work that varies from port (master) plan (specialized in the development of lay-outs), definition and optimization of port processes, real-time simulation studies, consultancy on inland transport, traffic reduction studies, modal shift studies, and many others.

Daniel Maragna Anton: A geoprocessing expert who graduated from the Federal University of São Carlos (2008), he also earned an Environmental Management degree from the Methodist University of São Paulo in 2006.

Daniel Tha: He is an economist with a degree in Business Administration from FAE in Curitiba (2004), a Master's degree in International Economy from the Erasmus Universiteit in Rotterdam (2008), and a Master's degree in Environmental and Natural Resources Management from the Vrije Universiteit in Amsterdam (2008).

Jean Pierre Dubbelman: As a nautical expert, Jean-Pierre Dubbelman is concerned with the nautical aspects of the design of ports and waterways. He is currently working on the Tietê-Paraná waterway, a Brazilian river that needs to become a navigable corridor. Both as a nautical expert and an inland shipper he is strongly connected to inland navigation. He is

involved in several (river) navigation studies, port design and (real time) simulations. He is also involved with associations such as Pianc and Koninklijke Schuttevaer, which is a Dutch representative organization for navigation.

Luiza Chantre de Oliveira Azevedo: An economist who graduated from Insper São Paulo (2011).

Maria Madalena Los: A biologist who graduated from the Fundação Universidade Estadual de Londrina (1979), with a Bachelor's degree in General Ecology from the Fundação Universidade Estadual de Londrina, a graduate degree (latu sensu) in Higher Studies with a major in Environmental Biology/Phytosociology from the University of Warsaw (Poland), a Master's degree in Ecology – Phytosociological Studies from the Department of Ecology of the Biosciences Institute of the University of São Paulo.

Pamela Rosa Tancredi: A civil engineer who graduated from the Mato Grosso Federal University - UFMT-MT in 2008, with a Master's degree in Planning and Operation of Transport Systems from the Escola de Engenharia de São Carlos of the São Paulo University - EESC-USP, and Ph.D. in Transport Engineering from the Escola politécnica of the University of São Paulo University - POLI-USP (in progress).

Poliana Avelar Guimarães: A civil engineer who graduated from the Goiás Federal University - UFG-GO in 2010, with a M.Sc. in Transport Infrastructure from the Escola Poltécnica of São Paulo University - POLI-USP (in progress).

Rutger Perdon: Rutger Perdon (M.Sc.) studied physical geography and has a Master's degree in Hydrology. He has been with ARCADIS for 9 years working mainly in the field of integrated water resource management. He specialized in the relation between management of water resources and planning (urban). Since 2007, Rutger has been working in the strategy and decision making group of the water division of ARCADIS. Here he works in strategic water-related projects, process and project management, policy making and stakeholder management. He also has extensive experience as an international consultant, for example, in Mexico, Costa Rica, the Philippines, Israel, Sudan, China and Russia. Rutger will assist with the benchmarking, the consultations and, later, the transport expert. Some of his relevant project experience related to the project includes Benchmark management of the North Sea, strategic management of stakeholders in Cintra and the Traffic Company, and policy evaluation for the "Actieplan BBI-Matra."

Sanne Ebbinkhuijsen: Sanne graduated in 2009 in Public Administration and has worked for the last 2 and a half years on several projects, mainly related to the field of national water resources policy, mostly for the Dutch government's executive authority for public infrastructure. Last year, among others, Sanne conducted two evaluation projects on crisis management in the aftermath of floods and drought. Over two years as Project Control Manager for a project where beacons to assist navigation along Dutch waters were made sustainable, she developed project management skills. She was responsible for management of project risks and reported monthly on project progress.

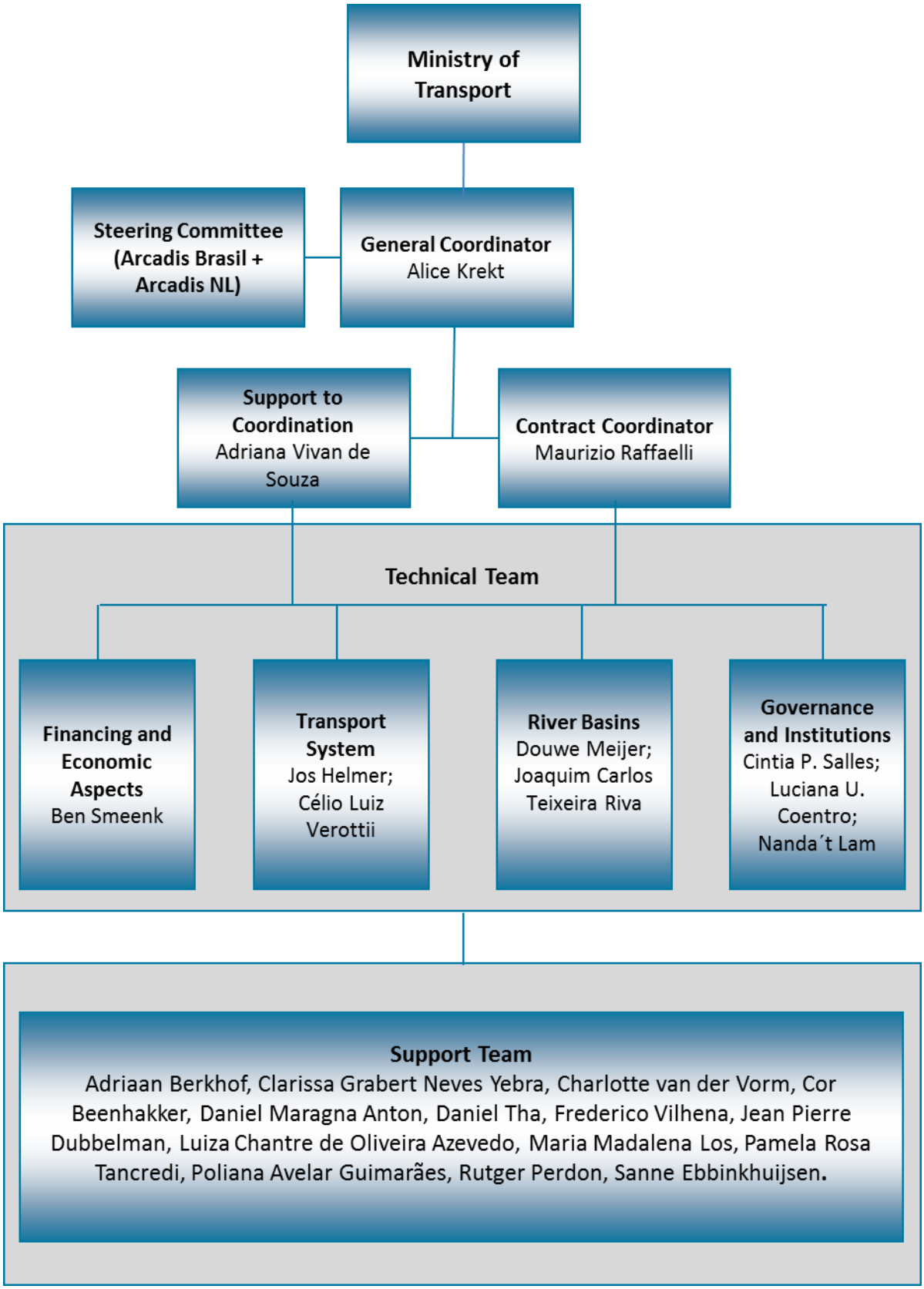


Figure 20 – Team organization

6 REFERENCES

Frank, Beate (2007): Governing river basins in Brazil: a model for evaluation

World Geography, (2010) http://world-geography.org/rivers/24-amazon-river.html

APPENDIX I

Curriculum of The Technical Team and Coordination

ADRIANA VIVAN DE SOUZA

Graduated in 1997 from Mackenzie University in Architecture and Urban Planning, with Master of Science (MSc) from University of Applied Science Cologne - Germany in Resource Management and Technology in the Tropics and Subtropics and Post-Graduation from University of São Paulo – POLI-USP in Building Technologies. She worked for São Paulo Transportes- SPTRANS/Municipality of São Paulo as a transport specialist, before joining ARCADIS Logos. She works as project coordinator at the Division of Infrastructure with experience in designing and planning transport infrastructure and urban development projects.

Key Works:

Demand Analysis and Stations Studies of the Guapimirim railway line, RMRJ-RJ, coordinated the analysis of the region, the Origin/Destination survey and the analysis of the stations and their surroundings potential.

Highway Ayrton Senna – Carvalho Pinto (SP 070), São Paulo, supported the coordination and the preparation of the studies and the concept and detail designs of the Highway improvements

New Development for Flood Risk Management and Urban Planning for the City of XAI-XAI (Mozambique), responsible for the urban planning studies.

Project METRASYS (Mega Transport System for China), gathered information of Jiading planning system and made a first contact with the Chinese partners, by means of conducting interviews with stakeholders, gathering documents and caring out field observations in Jiading-China.

ALICE (HARRIËT) KREKT

Alice Krekt (M.Sc.) graduated from Utrecht University, Social Geography and Urban planning, with specialization in Ports and Waterways in 1996. She worked for the Municipality of Rotterdam and the Port of Rotterdam in several positions, before joining ARCADIS. She is a project and program manager who keeps overview at strategic level, with an eye for stakeholders interests, always giving top priority to the results that need to be realized. She works with enthusiasm and inspires people to think creative and cooperate. Strategy development, transport economics and stakeholder involvement in an international context are important features of Alice's experience. Her long year experience with the Port of Rotterdam, and her experience as strategy consultant in Port Management and Inland Water Transport with ARCADIS provided her great knowledge of the functioning of the Global and European network of Ports and Supply Chains and economic relevant aspects to determine strategy of policy makers and stakeholders.

Her experience can be illustrated by the following projects she worked on as project manager. Working for the Port of Rotterdam means working in an international context. Her international experience started about 15 years ago. As a strategic advisor to the board Alice worked on a comparative analyses on European ports. In that data providing project portfolios were compared, as well as cargo flows, costs, inland transport connections and land use. Furthermore, she developed a hinterland strategy for the Port of Rotterdam. Considering the current cargo flows, future possibilities and practical constraints, she prepared the strategy on the European inland network. This strategy included the modalities waterways, rail and road. The final outcome was an action program with priority projects. For the Port of Rotterdam Strategic Business plan 2006-2010 she developed the commercial strategy for the mid long term (4 years). By her team the evaluation of current economic activities was matched with future prospects resulting in priority sectors. After that the demands for infrastructure and space were matched with financial and technical possibilities. This resulted in the commercial strategy and investment plans. Later she was responsible for attracting more cargo flows and investments from North and South America as she was Area Manager of the Americas. With her team she made the strategic plan for activities in the Americas (Brazil being one of the focus areas for future growth). Later she implemented this plan with a staff of local (Rotterdam) and international (Brazil, US) employees.

As a senior advisor with ARCADIS she developed port strategies for several ports. Scenario development for the long and midterm she often uses as a decision making method and inspiration provider. For the Dutch National Ministry of Transport she worked on inland water way transport in an European context. As a consortium leader she explored inland waterways and the effects of climate change, including the ways to adapt on short and long term. For investments and projects improving the waterways she designed the “Checklist for working on the Waterway”. Aim was planning and executing the infrastructural works while causing as little obstructions as possible to the companies, residents and other stakeholders. Later she was process manager of a project on NOx management system in Port area, fitting the environmental regulations, planned investments of companies and demands of stakeholders.

Alice is member of the ARCADIS Shelter team: providing pro bono advice in developing countries as a ARCADIS global social corporate response activity (cooperation between ARCADIS and UN- Habitat). For instance in Sri Lanka she defined with her team a Water management strategy for improving water safety and water quality in two cities, including prioritization of actions. For the top 5 projects an action plan was provided. As Shelter team member she is also project leader of the Shelter Academy 2011, which focuses on sustainable economic development in port cities. Target group for Shelter Academy is mayor level from developing countries in Asia, Africa and South America. This mayors will work out case studies during a three days course, together with experts from ARCADIS and other organizations in the Netherlands.

BEN SMEENK

Mr.Ben Smeenk is a very experienced economist and consultant in the field of transport, logistics and water projects. He has a working record of 30 years with a number of very well known companies like NEA, Royal Haskoning, TNO, and Arcadis.

He started as an economist with the Ministry of Transport and Public works (Rijkswaterstaat). Important studies where the cost benefit analyses of the Markerwaard (large scale land reclamation), the Schipholtrack (a new railroad between Amsterdam and Rotterdam via Schiphol) and several waterway projects (Orange locks, Brabant canals).

After that he joined NEA, a Dutch Transport Institute. In this period the emphasis lay on transport economic studies like the Betuwe track (a dedicated freigt line between Rotterdam and the German Hinterland), Rhine Mian Danube Study, Twente Mittelland canal, and Lower Rhine corridor. Beside that he was project manager for the Transport economic Model, a set of modals for forecasting freight transport for all modes (road, rail, inland waterway and short sea). This model includes a port competition model (in the Hamburg Le Havre range), detailed information about regional economic growth in Germany and Belgium and a trade model for Europe and important trading partners. This model has been used for several forecasting porject in the Netherlands. An example is the integral transport plan in (SVV II)

At Royal Haskoning, TNO and Arcadis. Ben has worked on a large number of (transport) economic studies. The focus has been broadened to economic analyses in a number of fields, including energy, water quality and water quantity.

A few examples of studies on waterway transport and modal choice: (Sea)port choice model, modal choice in freight transport (together with Ecorys), terminal choice model for container transport (inland waterway and rail), Hinterland transport of main ports in Europe (for the port of Rotterdam), Comparing modalities, and an integral comparison framework for all inland transport chains (with NEA and Transcare).

He has also done international studies like a feasibility study for the Trans Siberian railroad (in Russia), Mobility management in Europe (MOSAIC), Eufranet (European rail network for freight transport) and shippers surveys in Switzerland and Germany.

Beside that he teaches at the NTH (a Transport High school) in the fields of European transport policy, freight transport and public transport.

CÉLIO LUIZ VEROTTI

A civil engineer who graduated from the Escola de Engenharia de São Carlos of the Universidade de São Paulo in 1969. He worked as an engineer in the construction of CESP's (Companhia Energética de São Paulo) hydropower plants between 1970 and 1994, having worked on the following projects: Ilha Solteira, Capivara, Porto Primavera, Rosana, Taquaruçu and Nova Avanhandava.

Also at CESP, he participated in the implementation of the Tietê-Paraná waterway, in the section currently in use between the São Simão plant and the Municipality of Anhembi, which involved the construction of ship locks at the Nova Avanhandava plant, supplementary civil construction and electrical-mechanical assembly of the Promissão and Ibitinga locks, as well as implementation of the navigation trajectory/route, including signaling for this section of the waterway and the construction of terminals along it.

As a project coordinator he has been working on the preparation of studies on Small Power Plants over the last 15 years.

CINTIA PHILIPPI SALLES

PHD in Public Health, focused on environmental health from Universidade de São Paulo (2004), Master in Public Health, focused on environmental planning from Universidade de São Paulo (2000), Specialist in Environmental Controls from Universidade de São Paulo (1995) and degreed in Environmental and Sanitarian Engineering from Universidade Federal de Santa Catarina (1991). More than 20 years of experience in environmental studies applied to support decision making in public and private sectors.

Key Works:

Coodinates the revision of the Environmental Management System of the National Transportation Agency (ANTT) in Brazil.

Coordinated various projects on potencial green energy (Biogás) generation for public and private sectors.

Experience in coordinating public consultation for hydroelectric energy generation program implantation and an Environmental Integrated Evaluation for the Tocantins river basin.

Participated in the Country's Environmental Evaluation among other important projects.

DOUWE (GERBRAND) MEIJER

Douwe Meijer graduated in 1992 from Delft University of Technology - College of Civil Engineering, Department of Hydraulic, in Civil Engineering with a major in River Hydraulics and Morphology. Douwe worked 4 years for Delft Hydraulics (today Deltares) for the Hydraulic Structures Group. After this, Douwe joined HKV Consultants, focusing on river management and flood defense projects. In this job, Douwe worked, among others, for a Swiss client on a monitoring and modeling project of the River Rhone and for the German Federal Hydraulic Institute on a modeling project of the River Rhine.

From 1999 until 2008, Douwe and two partners ran their own office Meander Consultancy and Research, which performed large studies for running programs , such as "Room for the River" (Dutch Rhine Delta) and "Meuse Program" (River Meuse), both dealing with improving flood safety. Since 1996, Douwe has worked (and still works) for both the Dutch and the Belgian Authorities of the common Meuse, which is the border between both countries. Besides, an important objective of the Meuse Program is an upgrade of its navigability (CEMT class Vb). This is where Douwe first experienced the interaction between river management and navigability studies. For the German Federal Hydraulic Institute, Douwe performed extensive modeling projects of the rivers Rhine, Neckar, Mosel and Main. Today, these models have been integrated into an extensive Dutch-German prediction model, permanently running and providing online water level forecasts for skippers. In this period, Douwe participated in projects for other clients in Germany, Belgium, France, Poland, Malaysia and Nicaragua as well.

In 2008, Meander was integrated in the ARCADIS Water Division after ARCADIS Netherlands acquired the company. Currently, Douwe is still involved in the programs Room for the River and the Meuse Program and still serves his clients in Germany and Belgium. After joining ARCADIS, Douwe has added international working experience in India, Morocco, Haiti and USA to his record.

With more than 20 years of experience in river management projects, Douwe Meijer M.Sc., senior river management consultant, has contributed to numerous river engineering programs, that focus on flood defense (including long-term flood safety measures due to clime change), navigability, hydraulic structures, river reconstruction, ecological rehabilitation, hydraulics and morphology. Douwe has contributed continuity to substantial national and international river programs, throughout his career. Regularly, he is invited to participate in readings or projects on a personal basis. Douwe professionally uses the languages Dutch, German, English, French and Polish.

LUCIANA UNIS COENTRO

Master in Public Administration and Government, focused in Public Policy and Government Transitions form Fundação Getulio Vargas (2011), Specialist in Management for Sustainability from Fundação Dom Cabral (2008), degreed in Business Administration (2004) from Fundação Getulio Vargas. Have worked in consulting projects for the public and private sectors with an environmental and public policy perspective.

Key Works:

Participating in the revision of the Environmental Management System of the National Transportation Agency (ANTT) in Brazil.

Coordinating the evaluation of a São Paulo State Program called “Recovery Program for Riparian Forests”.

Coordinating recycling projects and ecoindustrial park studies for private companies, among others.

MAURIZIO RAFFAELLI

Graduated in 1960 from University of Rome – Italy in Civil and Hidraulic Engineering. He has long activity in the profession, vast experience in design, coordination and supervision of hydraulic construction works such as hydroelectric power plants, irrigation systems, waterway constructions, with special emphasis on master plans, feasibility and basic design studies. He has worked in projects in various countries such as Morocco, Peru, Bolivia, Paraguay, Turkey, Italy, Argentina, Brazil and Greece.

Key Works:

Hydroelectric Master Plan of the water basin of Jequitinhonha river (MG) with 55,000 km² of extension and total installed power of 1600 MW.

Master Plan for the Utilization of the Water Resources of Juquiá River Basin with the purpose of supplying water to the Great São Paulo region, controlling floods, and pick energy production.

Master Plan of the hydro electrical potential of rivers Acaray, Monday and Nacunday (20,000 km² of basins), Paraná river tributaries, in the Alto Paraná region, Paraguay.

Hydroelectric Master Plan of: Ariranha river (MT) with 120 MW installed power; Coxim river (MS) with 42 MW; Butiá river (PR) - 16 MW; Vermelho river (MT) - 21 MW.

Among Feasibility studies are highlighted: Itapiranga Hydroelectric Power plant in Uruguay river (SC/RS); Cevizlik Hydroelectric Power plant in Iyidere river – Turkey; Irrigation and drainage system of Baixo de Irecê (BA), covering gross surface of 380,000 ha; Multiple utilization of hydro resources of Desaguadero river, Bolivia; Irrigation of Pampas de Majes, Siguas and La Joya, Peru in an area of 100,000 ha.

Among basic designs are highlighted: Hydroelectric Power plant of Murta (MG); Water Supply works (130 km of tunnels and canals) transporting 34 m³/s, for the irrigation of river Colca basin, in Pampas de Majes, Peru; Hydroelectric Power plant of Retiro Baixo (MG).

JOAQUIM CARLOS TEIXEIRA RIVA

Naval Engineer fromPolytechnic School of São Paulo University - POLI-USP in 1967 with a Master at the Massachusetts Institute of Technology; Ocean Engineer from Massachusetts Institute of Technology, and Doctorate (PhD) in Marine Engineering from Polytechnic School - POLI-USP, has been working in activities related to sea, waterborne and intermodal transports, involving planning, design and monitoring of waterways interventions and protection of the environment facing the transport and water resources.

Key Works:

Tiete-Parana Basin: Several studies about institutional characterization of Tietê – Paraná Waterway, opposite the privatization of Tietê and Paraná power plants, and Project and Monitoring the Construction of Locks and Complementary Works, including Study and Waterway Transportation Planning, for CESP, 1976 to 1998

Araguaia-Tocantins Basin: Regional Development Plan of the Araguaia-Tocantins Basin - Intermodal Planning of Transportation and Project of the Aguarnópolis Terminal at the Tocantins river, Government of Tocantins / Riva & Riva, 2001/2002.

São Francisco River Basin: Coordination of studies, projects, works, interventions and revitalization services of the São Francisco River, incorporating containment activities in margins erosion, river course stability for water transport, maintenance dredging and modal integration, CODEVASF / FUNDESPA , 2007/2008

Sul Basin - Rio Grande do Sul: Fluvial Transport Studies of Wood, held for Aracruz, 2007; Inland Navigation Plan of Rio Grande do Sul, IPT, 1977.

Docklands Area: Santa Vitória Terminal Project, MG STRATA Engineering, 2009; Proposal for the Acquisition of the Vehicles Terminal of CODESP, 2008; Monitoring and coordination of complementary projects and construction of the Vehicle Export Terminal, Santos Brasil S.A., 2005/2007; Dredging Project of the COSIPA Canal, FUNDESPA, 2001.

JOS (THOMAS) HELMER

Mr. Jos Helmer brings with a long time experience in intermodal transport and global shipping. After completing the secondary education, he started his career in the shipping industry. He completed various high level management courses during his career, both in the field of marketing as well as financial management.

He held various posts in international shipping (17 yrs.), both in the conventional as well as container sector. He resided8 years in Kenya to introduce containerization in the Eastern part of Africa, stretching from Cape Town to Alexandria (WEC Lines). Thereafter he was appointed managing director of Rhinecontainer, a leading container operator in the Rhine basin. During this time initiated new IWT-liner serves, terminal developments in a.o. Gent, Belgium). An extensive network was developed and acquired a vast experience in the IWT, a.o. in the conventional inland waterway transport sector.

Thereafter he was appointed as senior business manager of the Port of Rotterdam, looking after the IWT interest in the port complex, and initiating different developments in order to make the sector more efficient in the way they are handling the port processes.

Since April 2010, when DuBarCo was founded, operating as an independent consultant in the field of intermodal transport. Assignments relevant to Brazilian worth to be mentioned are:

- A marketing study of the Lower Danube on behalf of a Dutch shipyard, which resulted into the start of a green field operation since 1,5 year, based in Constanza
- The rejuvenation of the IWT on the Nile, Egypt on behalf of a major listed company, Citadel Capital Services, Cairo. Project amounted to 300 mio$, construction of 30 motor barges, push barges and dum barges
- On behalf of the Dutch Ministry of Infrastructure (Verkeer en Waterstaat) surveying the market needs and expectations of the re-utilization of RIS-data (River Information Services) that could be shared by the waterway authorities
- Port of Amsterdam (Pilot Fresh Plants in Containers Shuttle), Re-desigining the work flow and IT-proces for major German railway operator (on-going)

NANDA `T LAM

Nanda is an advisor and researcher on system analyses in social-environmental issues, evaluative and assessment studies on policies and legislation and writing of guidelines and implementation frameworks. She works mostly in the role of project leader or project secretary organizing and supervising meetings, workshops and conferences with various

scientists, policy makers, social actors and interest groups. She is very good at organizing and linking scientists, policy makers and other stakeholders. In 2011 she did a learning workshop on Policy Analysis.

Nanda is a generalist on multiple substantive working fields in rural areas, including nature, water and agriculture. She has systems knowledge about the coastal dune ecosystem, delta and estuaria, especially in relation to climate change impacts, and also specialty in development of Climate Adaptation Strategies for rural and urban regions. Furthermore, she is familiar with different European policies en regulations, like EU Birds and Habitat Directive, EU Framework Directive on Water, EU Marine Framework Directive and policies on Integrated Coastal Zone Management and Climate Adaptation Strategies.

She participated amongst other in the following projects.

- OURCOAST - Integrated Coastal Zone Management (2011): writing a practical guide to European coastal partners to implement ICZM in their practice. The guide is based on an analysis of some 350 examples.
- Support Knowledge Network Delta Program (2010-2011): providing workshops for knowledge networking and policy research for the implementation of the Delta program.
- Research on Learning for Sustainable Development (SenterNovem, 2011): analysis of the effects of the use of social tools for achieving sustainability goals or policy objectives of government. The study provides an administrative support for the use of social tools.
- Economic Agriculture study of the province of Zuid-Holland (Zuid-Holland, 2010): expert session to arrive at an objective and independent future for agriculture in South Holland to prepare the Agenda for Agriculture. Project and report author.

Currently, the support of European cities in their climate adaptation strategies is one of Nanda's main projects. Furthermore, she is a member of the Community of Practice IJsselmeer area for the research program Building with Nature.

APPENDIX II

Index of the Master Plan

Summary

Appendix A Report on assessment and diagnosis of inland waterway transport

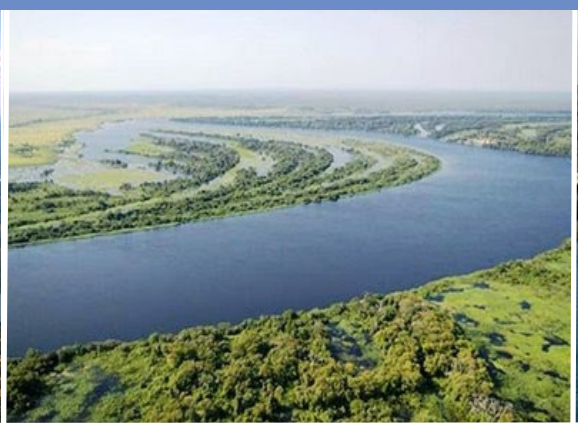
- The current situation, recent and future developments (without new policy interventions)
    - The economy
    - The river /waterway
    - The transport system
        - Links with other modalities
        - Governance and legislation
        - The financial system
    - The environment:
- International benchmark: Examples from European countries/the U.S.
- Methodology and sources
    - Methodology
    - Resources used/Links
    - The stakeholders contribution
    - Contacts

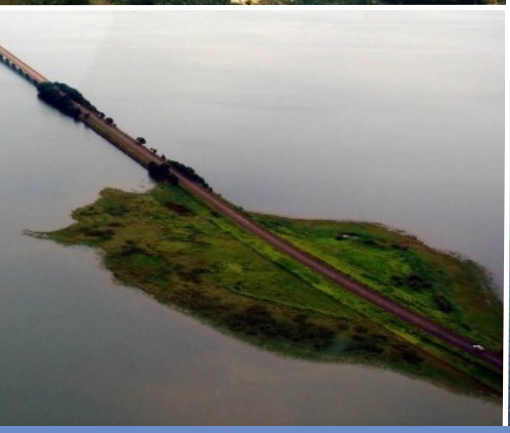
Appendix B Report on Consultation of Stakeholders

Appendix C Report on Elaboration and Evaluation of strategies

Appendix D Project leaflets (short description of the main projects)

Ministério dos Transportes



Consórcio

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