Ecological considerations in constructing marine infrastructure: The Falmouth cruise terminal development, Jamaica

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Ecological considerations in constructing marine infrastructure: The Falmouth cruise terminal development, Jamaica

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ABSTRACT

Cruise tourism is an important and expanding global industry. The growth of this sector,coupled with the continuous development of larger cruise ships, creates demands for new marine infrastructure. The development of these marine infrastructures takes place at the intersection of global cruise tourism, dredging and financial networks, and local social economic and civil society networks. In this paper we analyse how the interaction of these global and local networks influences ecosystem based design in marine infrastructure development, taking the Falmouth cruise terminal in Jamaica as case study. Based on this analysis of global and local networks four conditions are identified that enable and stimulate ecosystem based design of marine infrastructures: a shared (discursive) goal connecting global and local actors; brokers that connect different networks; the availability of adequate resources; and an environmental discourse that is materialized in standards and legislation.

1. Introduction

Cruise tourism is an important global economic sector. The sector depends on the quality and availability of marine infrastructure for its possibilities to grow, as cruise tourists often book a specific itinerary based on the ports and countries to be visited, even though they spent the majority of their time on-board. The cruise tourism sector is therefore constantly renewing and extending its marine infrastructure; terminals are being redeveloped and new terminals constructed [1,2].

The development of these infrastructures impacts the natural environment. Cruise ship terminals are often located in or in the vicinity of environmentally sensitive areas, such as coral reefs. The construction of hard structures in coastal areas can cause several problems, such as pollution from water run-offs during the use phase of the infrastructure and damage of the coastal and marine ecosystem during construction. To counteract the negative impacts from construction and use, innovative approaches are being developed. These approaches make use of innovative technologies and designs that integrate ecological dynamics to substitute conventional engineering interventions [3–5]. The innovative approaches for coastal infrastructure development that aim to reduce ecological impacts are depicted by concepts such as Building with Nature, Working with Nature and ecological enhancement. These can all be placed under the umbrella concept of ecodynamic development and design [5].

These new approaches and associated techniques (often) require adjustments in the project planning and design stages. The process of complementing or substituting conventional engineering interventions with ecological dynamics requires input of ecological knowledge, but also influences the process of knowledge creation and the roles of actors in knowledge processes [6]. In addition, recent studies show that in ecodynamic development and design projects developers have to deal with new uncertainties in project planning [7] and have to adjust their strategies in dealing with environmental legislation [8]. The application of these new approaches is furthermore influenced by and influencing governance arrangements. These new approaches bring the involvement of new actors due to requirements of new knowledge, expertise and public engagement. By the same token, increasing involvement of private actors can create enabling conditions for these new ecosystem based design approaches [5,9]. Such shifts in governance arrangements also impact the transfer of innovative techniques between different geographical regions. Cruise ports, and therefore also projects of port extension and innovation, are embedded in global networks through which experiences and new approaches and techniques in port development are shared.

In the development of marine infrastructure it is poorly understood how local place-based actors and global networks, such as those involving cruise tourism, influence the development of and possibilities for (environmental) innovation in marine infrastructural projects. In this study this is addressed by analysing how global and local actors put environmental considerations central in the design and

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development of a cruise port development project in Jamaica. The following paragraph introduces and discusses the conceptual framework and research approach. The third section analyses and discusses the design and development of the Falmouth Cruise Terminal in Jamaica. The focus is on how the interaction between local, place-based actors and global networks has influenced the project design, especially in relation to ecosystem based design approaches. In the last section conclusions are drawn for furthering ecodynamic design and development of marine infrastructural projects.

2. Theoretical and methodological approach

International cruise tourism is an important global economic sector with a contribution of US$ 2 trillion [1,2]. As an industry dominated by transnational corporations it is exemplary of processes of globalisation. Cruise ships are physically mobile and can freely roam in the global realm, making them difficult targets for national and international regulations [1,10,11]. Ports are a special entity in the global cruise tourism network, as they are situated in local places, but are overall experienced and managed as nodes in the global cruise tourism network. An extreme example is the development of 'fantasy islands' (such as CocoCay in the Bahamas and Labadee in Haiti[2]). Although these fantasy islands are promoted and marketed as a truly local experience, they are privately owned by the cruise company and off limits to all but their passengers and employees [10].

International cruise tourism is a rapidly growing industry, resulting in a growing demand for new and larger ports and cruise terminals [1,5,10]. Through marine infrastructural projects new ports and terminals are designed and constructed in practices where global actors of the cruise tourism industry, dredging and infrastructure development companies meet local actors of national/local authorities, industry and communities [see Fig. 1]. Or in terms of the sociology of networks and flows: these projects can be placed in between the space of flows with its global networks and the space of places with it local networks [12,13].

2.1. The governance setting of marine infrastructural projects

The global and local networks contain more or less strongly tied groups of actors that together form the governance setting of marine infrastructural projects. This governance setting influences the design and development of marine infrastructure projects.

As each project is located in a specific locality, it is connected to local networks situated in what Castells labels the space of place [12]. These local networks are attached to the local place and physical reality. There are various local networks that differ from each other on various grounds, such as the type of actors involved in these networks and the dominant 'rationality' that characterize actor interactions. Existing networks are not necessarily mutually exclusive and span actors from the state, civil society and private domain. For example, an environmental protection network could consist of civil society actors as well as state agencies. Local networks not only have different goals, but also differ in the resources network actors possess and can use to influence infrastructural project development.

Marine infrastructural projects are common, and developed around the globe, but are often only executed once in several decades in a specific locality. Therefore, expertise on planning, design and construction of marine infrastructure is in hands of a few globally operating consultancy, construction and financial firms operating in the space of flows: engineering consultants, marine consultants, marine construction (dredging) companies and financiers. Furthermore, initiation for the (re)development of marine infrastructure is often inspired and triggered by global developments. Global cruise tourism networks demand larger terminals due to the development of larger ships, marine construction networks have an interest in additional work and global financing networks are searching new investment opportunities.

2.2. Studying marine infrastructural project development

To understand the development of marine infrastructural projects in their governance setting and to unravel the inclusion of ecodynamic design and construction principles into marine infrastructural projects the concept of Marine Infrastructural Project Arrangement (MIPA) [5,9] is applied. The MIPA approach aims to understand the institutionalization of environmental principles into practices of design and construction of a particular marine infrastructural project. A MIPA is the temporary stabilization of the organization and the content of a marine infrastructural project. The organisation of a MIPA refers to the actors involved and their coalitions, the division of resources and influence between these actors, and the rules in operation (rules for project development and project construction). The content of a MIPA refers to the (project) discourses (the views and narratives of the actors involved in terms of norms and values, definitions of problems and approaches to solutions) and the specific content of four subsequent project phases: initiation, project decision phase, project design phase, and project construction. In each of the four phases environmental interests can be brought into the project, turning a conventional designed/constructed project into an ecodynamic designed/constructed one [see Fig. 2].

Coalitions within a MIPA consist of actors from the global network (cruise tourism, financiers and constructors) and local state, civil society and private actors [Fig. 2]. The stronger a coalition of actor networks, the more influential it is in adapting the project towards the objectives of these actors. The strength of a coalition can be assessed in terms of quantity (number of actors), influence (resources and power available) and the rules of the game (application of regulations and agreements that structure the interactions between these actors). In trying to maximize influence on project design and development actors form different coalitions and connections with each other.

To open up possibilities for ecosystem based design, there is an urge to change the MIPA from an early phase onwards. The possibilities for the design and construction of ecosystem based marine infrastructural projects through a MIPA increase if contractors, consultants and project owners are 'invited' and influenced to take ecological considerations into account in (co) developing the design and construction. This reshaping often takes place through an articulation of environmental objectives and regulations in the governance setting; that is: in local and/or global networks. Furthermore, as more projects are designed according to ecosystem based design principles, chances increase that these experiences are transferred to other projects, and become formal requirements throughout the global networks of marine infrastructural projects' design and construction [5].

2.3. Methodology

Methodologically, this paper is a single case study. A case-study approach was selected because this enables in-depth analysis of complex phenomena taking their context into account [14]. Generalisation of results is usually one of the weaknesses of a case study approach [15]. In this paper the planning, design and construction of the Falmouth cruise terminal is analysed based

[2] In the Caribbean 6 out of the 8 international cruise lines serving the region own such an island [1].

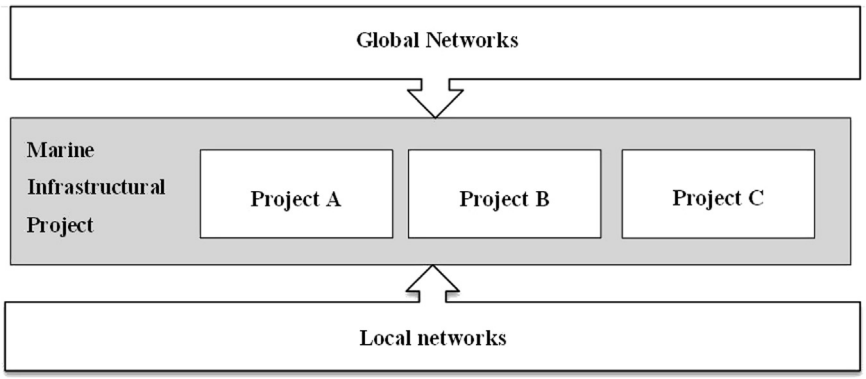

Fig. 1. Marine Infrastructural Projects as the interplay between global and local networks.

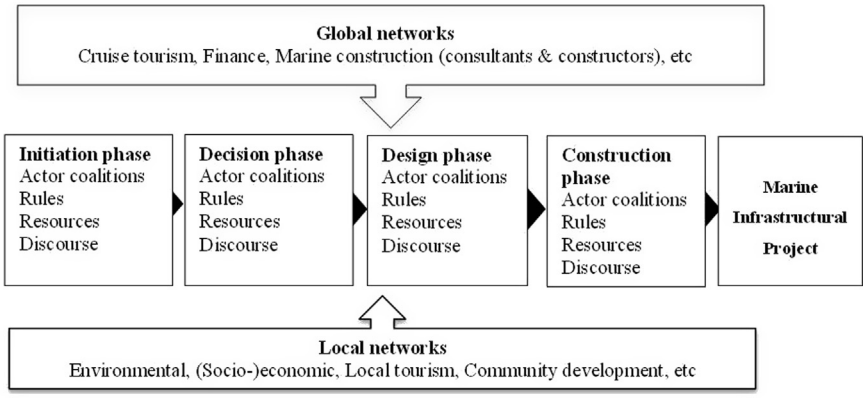

Fig. 2. Marine Infrastructural Project Arrangement.

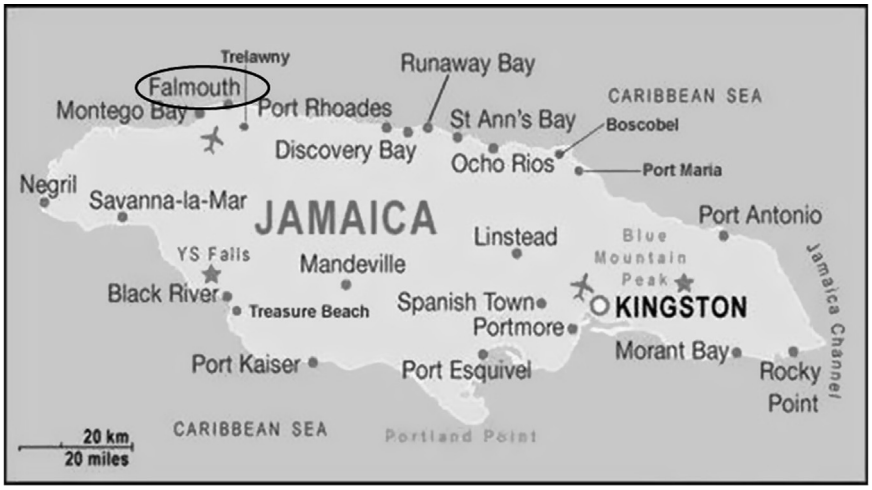

Fig. 3. Location of Falmouth in Jamaica.

on 17 qualitative, semi-structured interviews, document analysis and literature review. Of these interviews 14 have been conducted during a fieldwork period (August 2012) in Jamaica. This fieldwork period also included a site visit to the cruise terminal. The interviewees were representatives of the government, the project organisation and opponents to the project. In addition, three interviews were conducted with non-Jamaican based global actors (Pihl, Boskalis, and EKF) after the visit to Jamaica. The information of these interviews has been triangulated by the analysis of policy and project documents on the Falmouth terminal development, and international literature.

3. Falmouth cruise terminal, Jamaica

The description and analysis of this Falmouth terminal development is divided in three parts. The first part entails a case description to provide background to the case, such as the key actors, governance developments and the social and ecological effects of the designed terminal alternatives. The second part a focuses on the changes that have occurred within the project, the focus hereof is be on the networks that influenced the turn towards an ecodynamic marine infrastructure project in its distinct phases. This part is divided according to the four phases of

the project development. In the third part trends that can be distinguished the project development are discussed.

3.1. Setting the stage

Falmouth is located on Jamaica's north coast [Fig. 3], which is Jamaica's tourism hotspot with the existing cruise ship terminals (Ochio Rios and Montego Bay) and a wide variety of hotels and resorts [16–18]. Historically, Falmouth is known for its large sugar plantations and for its past as a major hub in the transatlantic slave trade. This historic character is preserved under the Jamaica National Heritage Trust Act [19]. Falmouth is located at the entrance of the Oyster Bay, well-known for the presence of Bioluminescent Phytoplankton[3], adding international significance to the protection of the bay. Other nearby areas with a high preservation value includes beaches, coral reef, mangrove forest, and the Martha Brae river [20].

The development of large cruise ships – the Genesis class – by Royal Caribbean Cruise Lines (RCCL) incentivises Caribbean states to upgrade existing or construct new cruise terminals. The size and draft of these new ships make it impossible to dock at the majority of the existing Caribbean cruise ports. As cruise tourism is of vital importance to the Jamaican economy [19,21][4] the Jamaican government and the Port Authority of Jamaica (PAJ) decided to upgrade the country's cruise tourism infrastructure to cater for these large ships. The first step was to investigate a suitable location, which resulted in the choice for Falmouth, based to geographic, environmental, political and social reasons (PAJ, 2012 personal communication).

During the development of the project, the initial 'finger pier' design [Fig. 4a] was replaced by a 'peninsula' design [Fig. 4b]. The main difference between the two designs is that the latter involved reclamation of land, which influences ownership of land (transferred to RCCL), creates possibilities for shops on the terminal and provides opportunities for integrated coastal protection (PAJ, 2012 personal communication). Furthermore, this change in design has also positive ecological implications. The amount of dredged material is more limited which reduces the sea grass being affected. Moreover, the dredged material can now be used for the reclamation of the peninsula, rather than being dumped in the ocean. The change in design did not require a new impact assessment as the changes had a positive effect on ecological impacts and specific measures to avoid or mitigate the ecological impacts are dealt with in an Environmental Management Plan (NEPA, 2012 personal communication).

To minimize environmental impacts during the construction of the terminal an Environmental Management Plan was developed, which included the relocation of coral and transplantation of sea grass. For coral relocation the main constructor Boskalis subcontracted Maritime and Transport Services (MST), which resulted in an innovative and unprecedented process of large scale coral reef relocation using divers [23–25]. Ecological impacts were monitored throughout the project by the constructor (Boskalis) and independent consultants hired by the National Environment and Planning Agency (NEPA)[5]. Despite these efforts corals were accidentally damaged, which resulted in additional compensation measures. Although deemed a major success by the involved actors, there is and has been (local) criticism on the ecological impacts of the project.

3.2. Changing project arrangement

During the development of the Falmouth cruise terminal the project arrangement was subject to changes. New actors entered the project bringing new perspectives, rules and resources with them, thereby altering the project arrangement. These new actors were also brought in due to changing (global and local) requirements of the project.

3.2.1. Phase 1: project initiation

The request to build larger cruise terminals brought actors from local and global networks together. Actors from both networks subscribed the need to build new cruise terminals, although their rationales differed. RCCL as representative of the global cruise tourism network focused on the growth of the sector worldwide and the need to add new accessible destinations and attractions. Renewing marine infrastructure is necessary for the large cruise ships that are not able to dock at the majority of the Caribbean ports. The Port Authority of Jamaica and the national government, as prime actors of the local network, are primarily concerned with maintaining growth of the local tourism industry, as backbone of the island's economy. Constructing a new terminal, instead of upgrading one of the existing cruise terminals, has as advantage that a new attraction is opened for an increased number of tourists.

During this phase PAJ took the lead and internalised the request of the international tourism industry for larger cruise ships into a story of national economic growth and opportunities. This internalisation (localisation) is reflected in the discursive setting of the project, focused on local economic growth for the Falmouth region. Furthermore, the development of the project at this stage is financed by the PAJ and the Jamaican government. Hence, PAJ had the decision-making power and the finances to set the terms of reference for the project initiation. The US based company IDEA[6] was hired to find an appropriate location. But at this stage they were purely providing information, while decisions were taken by PAJ [Fig. 5].

3.2.2. Phase 2: project decision

In preparing the project design, PAJ attracted external expertise to the project. The preparation of the project design consisted of three elements: a technical feasibility study, an environmental impact assessment, and the design of the port at historic Falmouth. Research for these three elements was delegated to Mott McDonald,[7], TEMN[8] and IDEA, respectively. In this process local and global consultancy and constructor networks were brought together, mediated by PAJ. The global consultancy network aims to deliver a project plan according to the aims and conditions of PAJ. As a result of this constellation, the project in this phase is designed based on Jamaican recommendations using resources (knowledge and expertise of

[3] This plankton lights up in the dark, giving the bay its nickname 'glistening waters'. This plankton can only be found at four places worldwide.

[4] In Jamaica, tourism accounted for 50,4% of the total foreign exchange in 2008 it (against 13.9% mining, 31.7% manufacturing and 3.9% agriculture) and has been around 50% since the 1980s [19,21].

[5] According to the permits, NEPA has invested US$12 million in the monitoring of the coral relocation.

[6] IDEA is a US based designer of branded port of call destinations, specializing in marine and waterfront development for signature port attractions. See also http://ideaorlando.com/.

[7] The US$248,150 (J$16.3 million) contract between PAJ and Mott McDonald is subject to Cabinet approval - required for contracts above $15 million - prior to formal award to Mott MacDonald. See also: UK firm to cruise Falmouth's harbor. The Gleaner, April 27, 2007.

[8] TEMN is a Jamaican based network that provides consulting services in the field of environmental management. The Network consists of a group of consulting firms and individuals with skills in the physical, chemical and biological sciences, engineering, architecture, oceanography and project management. This structure provides a broad base of knowledge and experience that has proven itself capable of providing sound advice on all matters of environmental management. (http://www.temnetwork.com).

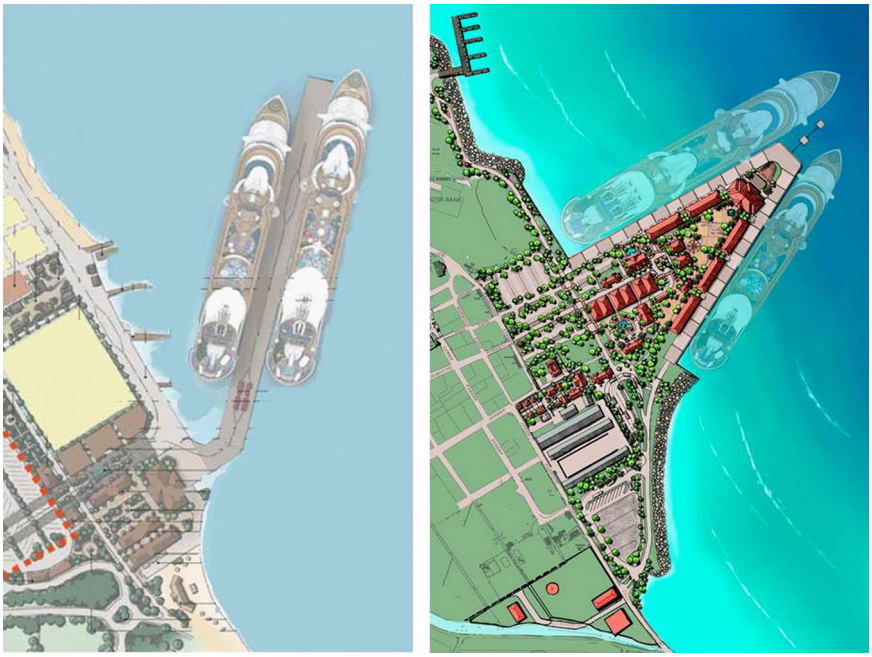

Fig. 4. (a) The finger pier design. Adapted from: [22]. (b) The peninsula design. Adapted from: [20].

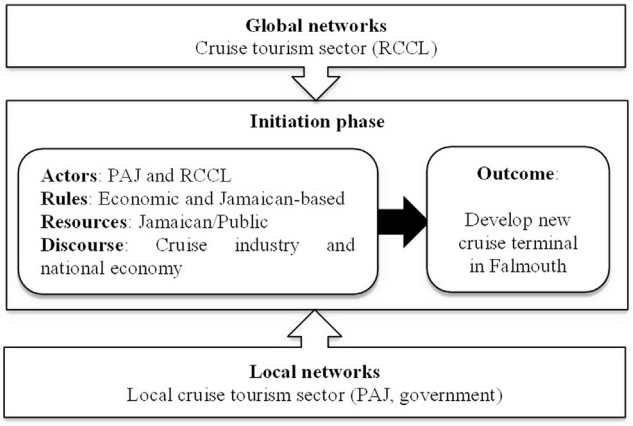

Fig. 5. Developments in the MIPA Initiation phase.

actors) from global networks. This has resulted in a project design that matched the demands of PAJ: the finger pier design [Fig. 4a]. This design allows the town and local population of Falmouth to become included in the project as the terminal pier becomes an integrated part of the town's waterfront. Regarding environmental considerations, the project was designed according to the ecological discourse that 'everything can be mitigated', reflected in the choice for a Jamaican based organisation to conduct the EIA. Recommendations in the EIA followed the 'everything can be mitigated' philosophy, central in Jamaica.

Based on the outcomes of this research a tender was designed for the construction of the cruise terminal [26]. A specific feature of this tender is the possibility to submit an independent financial offer.[9]. In choosing this construction the selection of the constructor (and thus construction design) is dependent on the financier. Neither the Jamaican government nor the PAJ had the financial resources to construct the project; hence they became dependent on the results from the tender process. In the selection of a constructor, the financing option became one of the most important requirements [Fig. 6].

3.2.3. Phase 3: project design

The project design phase is dominated by the dependency on international financial resources. The consequences of this influx of foreign capital and associated actors changed the MIPA [Fig. 7]. The new project arrangement created strong linkages between local and global networks. Two main causes of this alteration are the partnership established with RCCL and the build-up of PAJ's contribution.

First, the partnership commenced between PAJ and RCCL[10] became a necessity for PAJ after the received bids placed on the finger pier design were all above the allocated budget of US$ 125 million. To continue, additional resources were necessary. PAJ contacted and had discussions with all major cruise lines in the Caribbean area, which resulted in the partnership with RCCL (PAJ, 2012 personal communication). Important aspects of this partnership are the financial contribution of US$ 93.8 million by RCCL and the transfer of the initiative for the

[9] This financial offer should include project specifications, the amount of money offered, and the method of financing.

[10] The contract between PAJ and RCCL was signed on October 17, 2008.

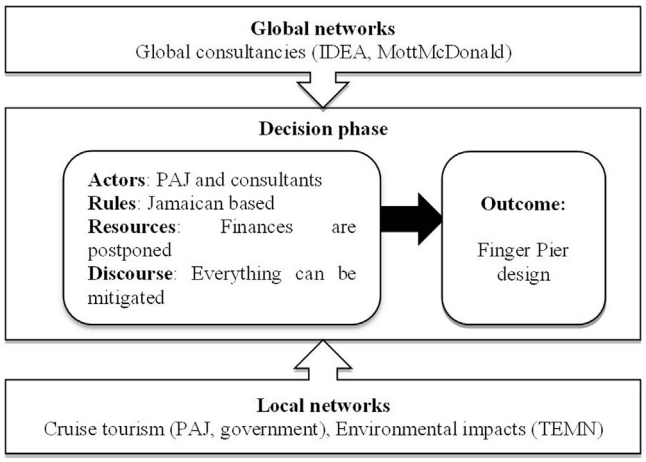

Fig. 6. Developments in the MIPA Decision phase.

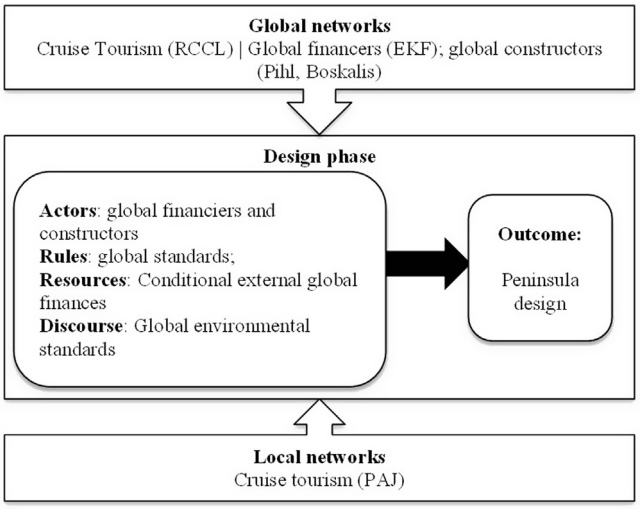

Fig. 7. Developments in the MIPA Design phase.

projects design to RCCL. The new design [Fig. 4a and b] included reclamation of land. The RCCL gained access to this new land, through ownership of all vertical structures and ownership of one (out of two) terminal. The dependency on foreign financial resources empowered a global actor, allowing them to set new rules of the game. Furthermore, the peninsula design reflects a new discourse, focusing on cruise tourists, rather than local economic development.

Second, the financial contribution of PAJ (US$263.3 million) to the project consists of a loan to be repaid by revenues of the terminal.[11] This loan was secured via the Danish Eksport Kredit Fonden (EKF) and was made available through involvement of the Danish constructor Pihl. This financial construction therefore influenced the selection of the constructor and allowed an actor from the global financial network to influence the project. Before securing the loan, EKF demanded that this project fulfilled the ecological standards set for all marine infrastructural projects worldwide. To test this, they scrutinized all environmental regulations and permits and set a series of additional environmental requirements to the project, among others environmental standards, environmental plans and reporting procedures (EKF, 2012 personal communication). As financier in this project, EKF used its resources to impose these ecological conditionalities on the project and contributed to a reformulation of the terminal design.

3.2.4. *Phase 4: construction*

In the construction phase the project was translated from a planning exercise at the drawing table into implementation. Social and ecological impacts of the project became a reality. Two main developments can be discerned that structured the outcome of this phase. First, it resulted in a renegotiation of the inclusion of the local community. Second, the ecological impacts were taken into account both by global and local actors.

In terms of negotiation with the local community, the MIPA in this phase was strongly structured by RCCL through the resource dimension. The demand of RCCL to make a physical divide between the terminal and the town resulted in a withdrawal of IDEA from the project. Through the construction of the fence, tourist are allowed to enter the village (although not recommended or encouraged), whereas local citizens are not allowed to enter the gated terminal area [27]. This situation opposes statements made in the initiation

[11] The RCCL is the major source for income as they rent the land for US$ 3 million a year and will pay a minimum of US$ 8million of passenger fees. The PAJ has therefore become dependent on RCCL for two reasons, firstly for the co-financing and secondly to receive money to pay back its loan.

and decision phases of the project, such as by Hugh Darley of IDEA: 'One of the nice by-products of this design, the City of Falmouth residents currently have only about five hundred (500) feet of beach that is not privately owned, in this new design you have almost a mile. All of this property is now accessible to the public and provides over two thousand feet of waterfront frontage promenade which you can walk along into the city' [28]. The fencing off of the cruise terminal from the town is strengthening the goals of the global cruise tourism actors. Thus although there was a renegotiation with the local setting, on this aspect coalitions from global actors win [Fig. 8].

On the environmental side, both global actors as well as local actors influenced the MIPA. As a globally operating actor, the Dutch dredging company Boskalis gained responsibility for both the dredging work and the development and execution of an Environmental Management Plan (EMP). The EMP was the practical materialization of combining the local discourse that 'everything can be mitigated' with the global discourse of international environmental standards. An important aspect formed the coral reef and sea grass relocation. According to permits set by NEPA, $12 million was invested in the monitoring of the relocation of corals, among others by hiring consultant CL Environmental Limited to oversee the process. During construction, the project was structured along hierarchical, top-down lines. As representative of the partnering contract with RCCL, PAJ passed tasks and responsibilities to contracted actors. Due to this practice, PAJ claimed that the project remained a national project, showing that Jamaica is able to implement a large project without major negative impacts (PAJ, 2012 personal communication). This top-down structure has consequences for the construction and the implementation of the Environmental Management plan. During coral relocation, monitoring reports had to follow the line of custody, from Boskalis, via Pihl and PAJ to NEPA. Responses traveled the other direction, resulting in poor direct communication between constructors (Boskalis) and the controlling actors (NEPA).

Pressure on the project organisation to reduce environmental impacts by requesting among others scrutinizing environmental permits did not only originate from global networks, but was also placed by local environmental groups, such as the Jamaica Environment Trust (JET). Efforts included actions to improve conditions in the permits issued by NEPA. Based on an analysis of the retrieved monitoring reports JET claims that: "A lot of money was spent to monitor this project, but the environment was still damaged" [29]. JET recommended that communication between the various organisations involved in the monitoring, permit conditions and enforcement should improve [29,30]. Furthermore, through presence of local organisations in the vicinity of the construction site, malfunctions were noticed and made public, which forced NEPA to take action.[12]

3.3. Trends in the project development

In the development of the project, different actors, resources, rules and discourses from global and local networks influenced the development of the project (Table 1). Firstly, actors from the global cruise industry network stipulated a specific design of the terminal representing dominant discourses and visions from the global cruise industry ('growth of the sector' and 'accessible destination'). Secondly, actors from local networks, such as the Jamaican government and PAJ, formulated a local economic growth discourse. Thirdly, financiers and constructors from global private networks strongly insisted to take environmental effects stronger into consideration. Finally the local civil society network opposing the project articulated the negative ecological impacts of the project and was represented among others by JET.

Coalitions, discourses, rules and resources from these networks were not of equal importance during the project development, although changes in these dimensions from both local and global networks affected project development [Fig. 9]. At the earlier stages PAJ as actor from the local economy network was able to set the rules of the game and was in charge of project development. However, through resource dependencies, the RCCL as actor from the global cruise industry network took over as dominant rule setter and project developer in the later stages. This was reflected, among others, in the project design (construction of the fence dividing the cruise terminal and the town). The opposing discourse coalition has not been without effect, even thought they were not able to gain dominance in a sense of project termination, redesign or significant change. It influenced the 'mitigation' discourse, and forced NEPA to strictly monitor and enforce the environmental permits. The pressure of JET on PAJ and NEPA resulted in additional and independent monitoring and hence decreased environmental impacts. According to PAJ, all regulations (environmental and planning) were Jamaican regulations, based on and in accordance with international regulations and treaties (PAJ, 2012 personal communication).

Inclusion of specific design and construction methods in the maritime infrastructure project is more likely when the goals related to these methods are expressed by powerful actors from both local and global networks. Representatives of these networks, however, do not necessarily actively need to connect or form coalitions, but could also just have the same (sub) goals. The local opposition network and the global financiers and constructors networks advocated the same goal (environmental scrutinizing of project planning and construction), but actors of networks did not link up during project development. On the contrary, the strategy of JET was specifically designed to target NEPA and PAJ, without interacting with international actors (JET, 2012 personal communication). Therefore, matching goals is important, even without interactions or forming coalitions between actors form global and local networks.

The analysis reveals that PAJ has been a central actor throughout the entire project development. This central position was used to bridge actors from the various global and local networks to the project and to each other. Although PAJ remained a central actor, the role it played changed throughout project development. In the initiation and project decision phase PAJ was able to steer the project in its preferred direction, drawing from and using discourses, rules and resources from both local and global networks. In these earlier phases PAJ served as crucial linking point between these networks, serving as a gatekeeper in deciding which (design) elements and approaches were adopted in the project. In the design- and construction phases the role of the PAJ became more dependent on resources of global networks in adjusting the design and scrutinizing environmental permits. Here PAJ became more of a facilitator or even translator, allowing other actors (especially from global networks) to gain influence in project development and design.

4. Conditions enabling ecosystem based marine infrastructure design and construction

In the previous section it was concluded that interaction between global and local networks is essential in influencing the project design. This section will, based on the analysis, discuss under what (enabling and constraining) conditions interaction

[12] To show the (negative) effects of the construction a film was made by a Jamaican activist, and is visible on YouTube: https://www.youtube.com/user/mediavagabond/videos.

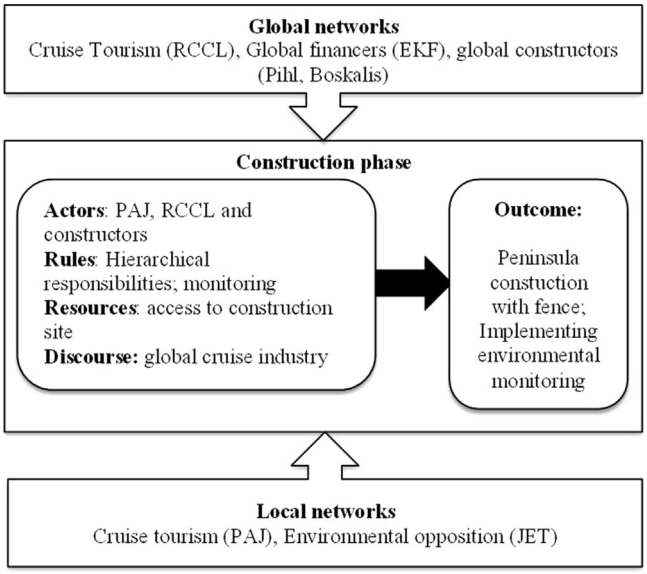

Fig. 8. Developments in the MIPA Construction phase.

Table 1
Summary of actors, their roles and influence on project.

Actor	Role	Influence on project
Initiation phase		
Port Autority of Jamaica	Initiator+project owner	Set Terms of Refrences
IDEA	Consultant	Historic port Falmouth
Royal Caribbean Cruise Lines	External financier	Providing reason to build new terminal
Decision phase		
Port Autority of Jamaica	Project owner	Mediator between consultants, defining design
Mott McDonald	Consultant	Providing information
TEMN	Consultant	Providing information
IDEA	Consultant	Providing information
Design phase		
Port Autority of Jamaica	Project owner	Engaged in search for partner to be able to continue with project
Royal Caribbean Cruise Lines	Financier+owner	Change of design to peninsula
Eksport Kredit Fonden	Financier	Scrutinizing environmental standards
Pihl	Constructor	Brought EKF to the project
Construction phase		
Port Autority of Jamaica	Project owner	Hierarchical project organisation
Royal Caribbean Cruise Lines	Project owner and financier	Focus on cruise tourist, create division between terminal and town
IDEA	Consultant	Withdrew from project
Boskalis	Constructor	Environmental Management Plan
MST	Constructor	Coral relocation
Jamaica Environment Trust	Opposition	Scrutinizing environmental permits

between local, place-based actors and actors from global networks influences the project design, especially toward ecodynamic development and design. Four conditions are distinguished that enable the interaction between local and global networks in stimulating ecosystem based design approaches.

The first enabling condition is a shared (discursive) goal that connects actors from global and local networks. These actors do not specifically need to form a coalition to work together, as long as their goals are similar or compatible. In the Falmouth case both the local civil society coalition (headed by JET) and the coalition of global financiers and constructors articulated a strong appeal for environmental consciousness and innovation. These two coalitions did not actively seek each other's support in reaching their goals, but as this goal was expressed from both sides it did influence the project design.

A second enabling condition is the availability of resources for ecodynamic design advocates, as this increases the ability to influence project development. The ownership of or access to knowledge and information, decision-making power, and the availability of financial resources are important as these can influence the project. More resources (financial, knowledge, information, and decision-making) available for ecodynamic design advocates results in an increased power base to influence planning and design. Changes in the distribution or allocation of resources can change the entire project arrangement. This also affects environmental performance, as resource-rich actors and networks can enforce environmental innovations and strict environmental rules. On the contrary, the lack of available resources can force a project team in favor of a conventional design to connect with other – more resourceful – actors and networks. The shortcomings of Jamaican local (financial) resources resulted in a major influence of global actors in the project design, through the influx of foreign capital.

A third condition is the environmental discourse that is materialized in current legislation. Environmental legislation in

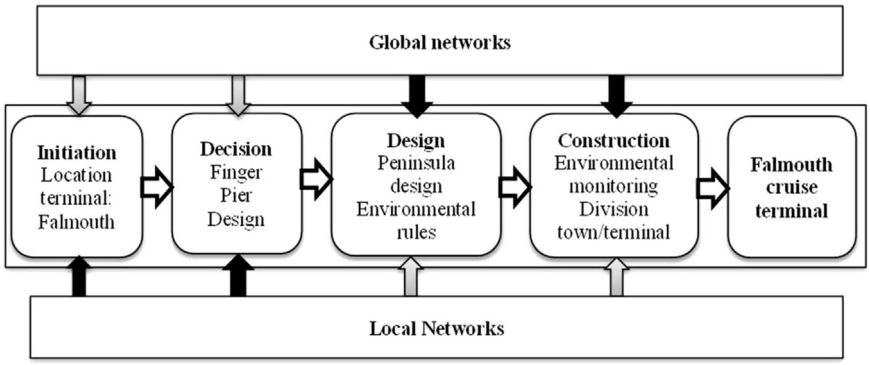

Fig. 9. Influence global and local network actors in ecosystem based design decisions.

Jamaica prescribes a mitigation approach to ecological impacts of infrastructure developments (NEPA, 2012 personal communication). The mainstream environmental discourse at the local setting of the projects' implementation has impacts on the planning and design of a marine infrastructural project. If global networks gain a major influence, their dominant discourse gains in importance. In the Falmouth case, the local and global environmental discourses ('reducing environmental impacts' and 'everything can be mitigated') were connected into a common environmental project discourse, forming an enabling condition for ecosystem based design approaches.

A fourth enabling condition is formed by network brokers or bridgers: actors that are based at one (global or local) level, but have the ability to link actors, discourses, rules and/or resources of the global and local networks in project development and design. In our case such a bridging actor was the locally based project owner (PAJ), with the role and capacity to work together with both contracted and legally required actors. Such a bridging actor can also take the form of a gatekeeper, deciding which actors, discourses, rules and resources from different networks have to be activated and are included in the project decision, design and/or construction. This role of gatekeeper is important in steering towards ecosystem based design approaches.

5. Discussion and conclusion

The cruise tourism sector is a truly global sector, which set standards for marine infrastructure such as ports and cruise terminals. More and more this will affect the development and design of local tourist locations. The development of marine infrastructural projects is the place where global and local networks meet; projects are designed and constructed by coalitions of global and local actors, making use of discourses, rules and resources from local and global networks. This paper aimed to gain a better understanding on how actors, discourses, rules and resources from global and local networks influence the initiation, decision, design and construction of place-based marine infrastructural projects and specifically how improvements regarding the environment are institutionalized in these projects. Analysis of the Falmouth cruise terminal development in Jamaica provided an in-depth understanding of how global and local network connections and interactions influenced environmental project improvement.

Some authors concluded that the environment has to be protected from the intrusion of global flows by place-based environmental resistance [31], while others point at the inclusion and articulation of environmental protectionism in the space of flows [32]. Our analysis shows that in the case of marine infrastructure development, environmental improvements and protection can be institutionalized in and triggered from both global and local networks. The materialization of environmental improvements is especially likely when the two 'meet'. The initial aim to construct the Falmouth cruise terminal was to retain and strengthen Jamaica's position in the international cruise network. However, construction of this (globally-induced) terminal would result in additional environmental pressure locally. During project development environmental concerns and measures were introduced and articulated, based on discourses and rules originating from global construction and financiers networks. Also, local place-based networks of the state and NGOs articulated (social and) environmental interests in project design and development through their rules, resources and discourse. The conclusion that environmental requirements and innovations can be a co-production of local and global actors, rules, resources and discourses adds to Castells' one sided perspective on environmental protection in the information age. Castells [12] attributes only negative side effects of the space of flows regarding environmental. Our conclusion resembles the arguments of Mol and Spaargaren [33,p61] and is in line with the empirical work of Presas [34] on transnational buildings, showing that environmental requirements are articulated and advocated by both global environmental requirements and local environmental management.

This paper primarily focused on how global flows and networks have influenced the environmental performance of place-based projects. A next analytical step would be to investigate how place-based projects influence global networks, to understand how and whether ideas, information and new techniques from actual place-based projects could be and are institutionalized in global flows and networks. Falmouth might also serve as a case for this, as stated by Peter Berdowski (CEO of Boskalis): 'An international project where proposing a Building with Nature approach has helped us make a difference is the Falmouth cruise ship terminal in Jamaica. Here, smart project design in combination with an extensive coral transplantation program has helped to preserve a valuable sensitive habitat while enabling economic development, both of which are important for Jamaica' (cited in: [35] p.34. Experiences of this Jamaican project thus feed into the global dredging industry, an important global network in marine infrastructure development. Through projects such as the Falmouth cruise terminal this Building with Nature approach, as a specific example of ecodynamic development and design, is constantly further improved, articulated and strengthened (see [23,35]). Knowledge gained from this project might thus be institutionalized in the global networks of constructors, financiers and consultants and could be implemented in future maritime infrastructure projects around the world. In other words: experiences of local projects define and set best practices and benchmarks for the global dredging network in favor of future place-based marine infrastructural projects at other places.

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