



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.

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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 Haiti²). 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 its 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].

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