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Performance evaluation of lake basin water governance using composite index

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ABSTRACT

A Lake Basin Water Governance Performance Composite Index (LBWGPCI) framework was developed to test and evaluate the performance of water governance for lake basins using the Songkhla Lake Basin (SLB), Thailand as a case study. The LBWGPCI integrates a range of water resources and environmental related indicators together to provide a holistic profile of lake basin key water governance issues. The purpose of this work was to identify, examine, develop and analyze key lake basin water governance performance indicators, test them on the SLB, and make appropriate recommendations for improvement. In the light of the results obtained in this study, overall composite index of the LBWGPCI indicated poor performance, which required high priority, urgent and critical actions. We conclude that the water governance performance of the SLB is still evolving and has a lot of great potential to grow in the right direction if the current focus and commitment of government and stakeholders at all levels, are maintained and sustained.

1. Introduction

Measuring governance performance is often complex because in most cases we do not know what and how to measure (Bohringer and Jochem, 2007). This has made the development of water governance performance indicators difficult and extremely limited; and often, the existing indicators only measure governance outcomes and do not offer holistic views of governance practices (Dunn and Bakker, 2009). On the flip side, if developing water governance performance indicators is such a challenge, imagine the even greater challenge of developing lake basin water governance indicators. Most researches that involve lake basins are usually focused on water management (quantity and quality) with little on governance; and where governance indicators are developed, they are majorly measuring outcomes only (Cosgrove and Rijsberman, 2000; Ballatore and Muhamdiki, 2001; Dunn and Bakker, 2009; RCSE and ILEC, 2014; Pahl-wostl et al., 2012; Nowlan and Bakker, 2007). Fekete and Stakhiv (2014) observed that one of the most difficult evaluations is the performance assessment of institutional change (laws, policies, regulations), which are considered key to effective water resources management. Research revealed that performance indicators for lake basin water governance have not been developed as a specific framework. To this effect, this paper attempts to develop a structured framework for Lake Basin Water Governance Performance Composite Index and used it to evaluate the governance situation of the Songkhla Lake Basin (SLB), Thailand.

Performance measurements are best captured by the use of indicators to assess the working of a system; an indicator can help to determine what direction should be taken to address the problematic issues (Hiremath et al., 2013; Walmsley et al., 2001; De Sherbinin, 2003; Nardo et al., 2005; Lawrence et al., 2002; Mercer and Christensen, 2011; Behn, 2003; Guy and Kibert, 1998). In general terms, it is a quantitative as well as a qualitative measure derived from a series of observed facts that can reveal relative positions in a given area and helpful in setting policy priorities and in benchmarking or monitoring performance (OCED-JRC, 2008; Brand et al., 2007). On the other hand, a composite indicator is formed when individual indicators are compiled into a single index on the basis of an underlying model/framework. Composite indicators are

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aggregate index of individual performance indicators (Jacobs et al., 2004) and they reflect the relative values of what is being measured and it should ideally measure multidimensional concepts that cannot be captured by a single indicator. Composite governance indicators offer possible explanation behind the different levels of performance achieved through the intervention of various policies, programmes and regulations (Smith, 2002; OCED-JRC, 2008 Fekete and Stakhiv, 2014). Sandoval-Solis et al. (2011) noted that performance indicators can evaluate water management policies and enable the comparison of alternative choices as well as give insight into the performance of natural resources management systems (Hooper, 2006).

However, some performance indicators have been developed to track the relative effectiveness and efficiency of policies on water resources management and governance (CII, 2008; WIN/IRC, 2010; Araral and Yu, 2010; DFID/ODI, 2003; Edelenbos et al., 2012; Hooper, 2006; USAID, 2009; SIWI, 2010; Pahl-Wostl et al., 2010a; UN-Water, 2012; UNDP, 2012; OECD, 2011; TI, 2012; IIT/IRC, 2008; CFUV/UNU-EHS, 2011; World Bank, 2006; WURC/IRC/WIN, 2006–2007; UNDP, 2011) and water sustainability (Lawrence et al., 2002; Policy Research Initiative, 2007; Morin, 2005, 2006; Chaves and Alipaz, 2007; Chenoweth, 2008; Sandoval-Solis et al., 2011; Juwana et al., 2012). Research also revealed that water related sustainability indices tend to be more popular and widely used, while water governance related indicators seem to be more restricted to development and UN related organizations, and international development NGOs.

Few indicators for lake basins have been properly documented. Duda (2002) presented an indicator framework for evaluating operational programmes in transboundary lake basins. Also, the Global Environment Facility (GEF) project of the Lake Basin Management Initiative (LBMI) developed the Integrated Lake Basin Management (ILBM) governance indicators (World Bank, 2005; ILEC, 2005). The ILBM indicators took into consideration the concepts of basin approach, lake characteristics, ecosystem services and governance challenges (ILEC, 2011). Chidammodzi and Muhandiki (2015) using the ILBM framework developed indicators for the assessments of Lake Malawi Basin even though it was not tested in the reported study. As much as they all successful experiences in the implementation of the existing indices, we still need more specific lake basin water governance performance indices tailored to address the complex socio-ecological challenges of governing lake basins. This index will be able to assess the status of management and governance processes of lake basins and to assist in the prioritization of water resources plans and programmes in the basin.

The main purpose of this work is to identify, develop, examine, analyze and test key water governance performance indicators for lake basins. Therefore, the work is of utmost significance because it presents a unique and innovative system for continuous assessment of water governance performance in lake basins through a specific structured framework of composite indicators. The remainder of this paper is structured as follows: following this introductory section, we present the description of the case area – Songkhla Lake Basin (SLB), Thailand, and the next section presents detailed methodology used in this research; this is followed by the section presenting the summary of the most relevant results and finally discussion and conclusion.

2. Case study

2.1. Songkhla Lake Basin in Thailand: a case study

Songkhla Lake Basin (SLB) is an area of 8020 km^2 in southern Thailand with a population of 1.7 million people (NSO, 2012). It spans three provinces in Southern Thailand, namely Phattalung, Songkhla and Nakhon Si Thammarat and consists of 12 sub-basins. The major economic activities in the Basin include: rubber plantations, paddy rice farms, fruit tree orchards, fisheries, aquaculture husbandries and a high attractive tourism potential (Tanavud et al., 2000) (Fig. 1).

The SLB consists of both land and water areas. The water area covers approximately 12.5% (1040 km^2); a complex ecosystem rich in biodiversity with multitude of flora and fauna species. Songkhla Lake is Thailand's largest freshwater and lagoon ecosystem consisting of four sections, forming three shallow basins connected to each other and to the sea by relatively narrow deep channels (EMSONG, 1997). The northernmost basin, Thale Noi, is a freshwater swamp of approximately 1.0–1.5 m depth. Thale-Noi hosts the largest wetland and waterfowl reserve, and is the first world Ramsar site in Thailand. Connected to Thale Noi on the south is Klong Nang Rium, a huge fresh to brackish water basin. On the north of the SLB is Thale Luang and on the south is Thale Sap with depth of 1.3–2.4 m. Thale Sap is connected on the south by a long narrow channel, approximately 8 m depth, between Pak Payoon and Pak Ror. Farther south of the Basin is the brackish and marine water, Thale Sap Songkla, 1.0–1.5 m depth. The systems finally open to the sea through a narrow channel near Songkhla town, approximately 8 m depth (ONEP, 2011; NEDECO, 1972; Tanavud et al., 2001; NESDB and NEB, 1985; Lesaca, 1977).

The annual mean rainfall in the SLB is put at 1549–2399 mm, with an average of 2043 mm, especially during the monsoon season. The estimated mean total surface runoff from several hundreds of smaller rivers and streams in the Basin is 5500 million m^3, often dropping to 2000 million m^3 in dry seasons. The total volume is stored in the Songkhla Lake at a mean sea level of 1600 million m^3 and increases to 3800 million m^3 when the Lake level reaches 1.5 m MSL (Taylor & Sons, 1985; EMSONG, 1997). There are three major potential sources of groundwater resources in the SLB; the shallow sand aquifers, deep gravel aquifers, rock aquifers and meta sediment aquifers (NESDB and NEB, 1985). However, water shortage is a problem in the entire area, notably during the dry seasons, and affects water supply and agricultural sector (GWP, 2012). Other stressors include overexploitation of the rich natural resources and serious environmental pollution resulting from human and industrial activities, depletion of biodiversity, devastation of life supporting systems, deterioration of water quality, depletion of fishery resource, as well as social conflicts in water and other resources use (Ratanachai and Sutiwipakorn, 2006; Pornpinatepong, 2010; Chesoh and Lim, 2008; DEQP, 2008; ONEP, 2013).

The focal point organization for the implementation of the Integrated Water Resources Management (IWRM) in the Basin is the Songkhla Lake Basin Committee (SLBC), established in 2007 by the Department of Water Resources (DWR) (Kongthong and Ratanachai, 2012). The SLBC operates through a three-basin working group responsible for the three aspects of the river basin management: integrated river basin planning, information and public relations' and participation (DWR, 2006). The Songkhla Lake Basin Development Committee (SLBDC) is equally as important as the SLBC, although, much older. It was the first specific committee set-up for the purpose of the protection of Songkhla Lake, and was established in 1993 as an inter-agency coordinating body by the Office of Natural Resources and Environmental Policy and Planning (ONEP) to formulate policies and oversee, investigate and monitor activities related to the Basin conservation and protection of the natural resources and environment (ONEP, 2011). However, neither committee have the powers to effect change because they have limited mandates. At the local level, the Local Administrative Organizations (LAOs) (Provincial Administrative Organizations, Municipality Administrative Organizations