Contents lists available at SciVerse ScienceDirect



Environmental Impact Assessment Review



journal homepage: www.elsevier.com/locate/eiar

Promoting system-level learning from project-level lessons An analysis of donor-driven 'indirect' learning about EIA systems in Ghana and the Maldives

Amos A. de Jong ^a, Hens A.C. Runhaar ^{b,*}, Piety R. Runhaar ^c, Arend J. Kolhoff ^d, Peter P.J. Driessen ^e

^a Innovation Management, Utrecht, The Netherlands

^b Section of Environmental Governance, Utrecht University, Utrecht, The Netherlands

^c Organisational Psychology & Human Resource Development, University of Twente, Enschede, The Netherlands

^d The Netherlands Commission for Environmental Assessment, Utrecht, The Netherlands

^e Department of Innovation and Environment Sciences, Utrecht University, Utrecht, The Netherlands

ARTICLE INFO

Article history: Received 14 June 2011 Received in revised form 28 September 2011 Accepted 5 October 2011 Available online xxxx

Keywords: Learning EIA system SEA Donors Low and middle income countries

ABSTRACT

A growing number of low and middle income nations (LMCs) have adopted some sort of system for environmental impact assessment (EIA). However, generally many of these EIA systems are characterised by a low performance in terms of timely information dissemination, monitoring and enforcement after licencing. Donor actors (such as the World Bank) have attempted to contribute to a higher performance of EIA systems in LMCs by intervening at two levels: the project level (e.g. by providing scoping advice or EIS quality review) and the system level (e.g. by advising on EIA legislation or by capacity building). The aims of these interventions are environmental protection in concrete cases and enforcing the institutionalisation of environmental protection, respectively. Learning by actors involved is an important condition for realising these aims. A relatively underexplored form of learning concerns learning at EIA system-level via project level donor interventions. This 'indirect' learning potentially results in system changes that better fit the specific context(s) and hence contribute to higher performances. Our exploratory research in Ghana and the Maldives shows that thus far, 'indirect' learning only occurs incidentally and that donors play a modest role in promoting it. Barriers to indirect learning are related to the institutional context rather than to individual characteristics. Moreover, 'indirect' learning seems to flourish best in large projects where donors achieved a position of influence that they can use to evoke reflection upon system malfunctions. In order to enhance learning at all levels donors should thereby present the outcomes of the intervention elaborately (i.e. discuss the outcomes with a large audience), include practical suggestions about post-EIS activities such as monitoring procedures and enforcement options and stimulate the use of their advisory reports to generate organisational memory and ensure a better information dissemination.

© 2011 Elsevier Inc. All rights reserved.

1. Introduction

Despite some promising developments and rather extensive efforts of both donor and recipient actors in the past two decades, EIA systems in many low and medium income countries (LMCs) are rather weak (Ali, 2007; Alshuwaikhat, 2005; Appiah-Opoku, 2001; Kolhoff et al., 2009; Modak and Biswas, 1999; Sankoh, 1996; Van Loon et al., 2010). EIA systems encompass formal procedures, tasks and responsibilities laid down in *legislation* and *capacities* of the key actors that are assigned a role in EIA procedures (proponents, competent authorities and various sorts of stakeholders) to fulfill these roles (Kolhoff et al.,

2009; Van Loon, 2010).¹ Indicators of weak EIA systems in LMCs include incomplete EIA legislation (e.g. no scoping obligations), capacity deficiencies (such as a lack of scientific data and EIA expertise, a lack of monitoring and enforcement after licencing, weak organisational and communication skills, limited access to information and a lack of other resources) (Ali, 2007; Appiah-Opoku, 2001; Kolhoff et al., 2009; Sankoh, 1996; Van Loon et al., 2010). These EIA system deficiencies in turn contribute to a low system performance in terms of a timely delivery of valid information and the contribution to environmental protection (Kolhoff et al., 2009; Wood, 2003). Donors often struggle to construct links between their intervention programmes and the complex societal practice in LMCs. Their interventions typically are either at the EIA *project level* –e.g. advice on the content or quality of the EIA reports that are

^{*} Corresponding author. Tel.: + 31 030 253 3097.

E-mail addresses: amosdejong@gmail.com (A.A. de Jong), h.a.c.runhaar@uu.nl (H.A.C. Runhaar), piety.runhaar@wur.nl (P.R. Runhaar), Akolhoff@eia.nl (A.J. Kolhoff), p.driessen@geo.uu.nl (P.P.J. Driessen).

 $^{0195\}text{-}9255/\$$ – see front matter © 2011 Elsevier Inc. All rights reserved. doi:10.1016/j.eiar.2011.10.001

¹ Capacities include for instance management and communication skills, scientific expertise, availability of ICT applications and financial resources.

part of the construction of an oil platform or the reclamation of land- or at the system level -e.g. advice on EIA legislation or capacity development programmes for key EIA actors (Kolhoff et al., 2009; Van Loon et al., 2010). Whereas project-level interventions aim at environmental protection in concrete decisions, system-level interventions aim at enhancing environmental protection via the institutional context. An important condition for donor interventions to be successful in terms of realising the above aims is *learning* on the part of actors involved. Adapting projects or EIA system components as a consequence of donor advice namely requires that advice is taken notice of, understood and reflected upon against existing plans or systems. In EIA literature there is growing interest in learning evoked by EIA (e.g. Cashmore et al., 2008; Fischer et al., 2009; Fitzpatrick and Sinclair, 2003; Nilsson, 2005; Robinson and Bond, 2003; Runhaar et al., 2010; Valve, 1999). However, Jha-Thakur et al. (2009) observe that the understanding of learning evoked by EIA (and other forms of environmental appraisal) remains 'embryonic': still limited empirical evidence has been collected, hindering an assessment and explanation of this phenomenon. In this paper we discuss the results of an exploratory study on learning effects associated with donor interventions in LMCs. Our aim is to shed light on a particular type of learning we ran into, namely 'indirect' learning at system level. Through interactions and advice at project-level, donors may enhance awareness of system deficiencies such as unclear EIA legislation or insufficient capacities. This 'indirect' learning at system level complements 'direct' learning through system-level interventions such as capacity-building programmes and potentially results in adjusting EIA systems in manners that better fit the specific context and hence realise a better performance (Cherp, 2001; Cherp and Antypas, 2003; Kolhoff et al., 2009). These (potential) outcomes are often neglected by donor agencies for they generally do not consider indirect learning at system level as one of the goals of their project-level interventions. In fact, they often are not even aware of these effects.² Thus far, indirect learning at system level has not been discussed in EIA literature. With our paper we hope to contribute to our knowledge on learning evoked by EIA, both empirically (by focussing on LMCs) as well as conceptually (by addressing 'indirect' learning). In this paper we therefore address the following question: To what extent do projectlevel donor interventions contribute to system-level learning, and what are the explanatory factors for indirect learning at system level? We analyse project-level interventions by the independent expert body the Netherlands Commission for Environmental Assessment (NCEA).

2. Analytical framework

2.1. Indirect learning in the context of EIA

Learning is often defined as a full experience, i.e. cognitive change due to knowledge acquisition and, ideally, a subsequent change in behaviour (cf. Jha-Thakur et al., 2009; Joy and Kolb, 2009; Kolb, 1984; Mainemalis et al., 2002). In policy and organisational literature usually a distinction is made between single loop and double loop learning (see for instance Argyris, 1977; Nilsson, 2005). Single loop learning (oriented at manners to perform certain plans and their outcomes) occurs when actors recognise a mismatch between actions and outcomes in practice and alter original actions accordingly. Double loop learning (addressing the ideas and theories that constitute a mandate for action) occurs when such mismatches are corrected by adjusting the variables that underlie the original actions, i.e. strategies, behaviours and cultures (Argyris, 1977; Jha Thakur et al., 2009), for example when lessons learned by individual co-workers are integrated in organisational policies (Argyris and Schon, 1978). Double loop learning is thus of a higher order and more radical than single loop learning, as it relates to 'why' questions rather than 'how' questions (ibid; Fischer et al., 2009). Double loop learning however usually requires longer time horizons than single loop learning. A specific form of double loop learning is assimilation of environmental understanding into norms and practices (Jha Thakur et al., 2009), also called 'internalisation' of environmental values (Runhaar and Driessen, 2007). Single loop and double loop learning may occur individually but also collectively (e.g. within a project team or organisation). EIA project-level learning will probably address technical issues related to the project - e.g. single loop: what alternative mitigation measures can help reducing environmental pressure? and double loop: given the environmental impacts foreseen, does this initiative really contribute to a higher social welfare or should we allocate our resources to other projects? System-level learning (whether or not promoted by donor interventions) will probably address the relationships between the EIA system and its performance in practice – e.g. single loop: what is the best way to translate EIS findings into the licence requirements? how can we organise a more effective enforcement of EIA legislation? and double loop: does the national EIA legislation cover all relevant project decisions, or do we need to expand it, for instance to include SEA (to account for cumulative effects)? What we call 'indirect EIA learning' refers to both single loop and double loop learning at system level evoked by project level experiences and lessons. For instance, during EIA processes supported by donor organisations, local actors may become aware of certain shortcomings of the EIA system that governs their behaviour. Local actors may realise that problems in EIA processes show a repetitive pattern (problems with EIA have been faced before in other projects) and hence are related to the system as a whole.

2.2. Promoting factors for indirect learning

To explain indirect learning at the system level, we make use of literature on single and double loop learning, which is widely studied within the context of organisational learning (e.g. Argyris and Schön, 1996; Weick, 2001) and policy learning (e.g. Runhaar et al., 2010). Learning is considered as a process of making sense of aspects of the world around us, which is based on our frames of reference. Behaviour in general (Schneider, 1987) and learning specifically (e.g. Adler and Kwon, 2002) is always a function of the interplay between individual characteristics on the one hand and characteristics of the environment on the other hand. So we aim to find out what factors within and outside individuals may stimulate people to take the risk of reflecting on own actions and changing one's assumptions if necessary.

2.2.1. Individual characteristics

In the literature on learning within organisations (e.g. Blumberg and Pringle, 1982) capability and motivation are two interrelated individual variables that play a role in learning. The importance of capability for learning is recognised by Jha Thakur et al. (2009) (referring to actors' skills in terms of communicative, project management, leadership, team working, stakeholder management, conflict resolution and time management). In addition, new knowledge will only lead to changes if this knowledge is understood (Powell, 2006). The ability can be influenced by the sponsor, in that the knowledge of the sponsor has to be translated in such a way that it makes sense to the recipients, i.e. the local parties. "Failure to achieve this means that we may have created knowledge, but we have not created the conditions in which it can be applied (ibid, p.520)". Next to 'objective' capability, one's perception of capability plays a role too. In research on learning in organisations, much attention is paid to people's sense of self-efficacy, referring to the degree to which one is convinced that s/he can cope with difficulties s/he encounters in her/his work (Bandura, 1977). This is especially relevant in double loop learning since reflection on own assumptions can enhance the feeling of vulnerability and failure. A strong sense of self-efficacy in this sense can act as a 'buffer' for the scary consequences of double

² Source: experiences of the fourth author of this paper acquired during more than 10 years of advisory work on behalf of the NCEA in LMCs.

loop learning. Motivation has been studied in terms of commitment of different stakeholders to the problem at hand (e.g. Pahl-Wostl and Hare, 2004; Verbeeten, 1999) and their involvement in the process (preferably as early as possible) (Fischer et al., 2009). The more powerful actors are committed to the problem, the more likely system learning is to occur, especially when these actors have a clear mandate (Sinclair et al., 2008). Fischer et al. (2009) show the importance of the willingness of institutional actors to change established practices. In the literature on organisational development, willingness to learn is defined as the degree to which an individual is motivated to continuously improve oneself, for example by means of conducting new and challenging tasks (VandeWalle et al., 2000). This willingness to learn appears to stimulate people to take the risk of being confronted with disconfirming information and to be open for new ways of thinking and doing (Runhaar et al., 2010).

2.2.2. Contextual characteristics

Ability and willingness are considered as individual characteristics; however they are influenced by the opportunities people perceive in their environment (e.g. Adler and Kwon, 2002; Blumberg and Pringle, 1982), of which we name examples that are documented in literature on organisational learning and EIA. The more people are confronted with disconfirming information -information that does not fit into one's frame of reference- the bigger the chance that people reflect on their frames of reference. It is thus logical to expect that people cooperate within a diverse team, i.e. team members with different educational, professional or cultural backgrounds, the more one is confronted with diverse views and thus the easier reflection will take place (see also Fischer et al., 2009). Also in organisational literature, diversity - in terms of expertise - within project teams is considered an important predictor of learning and innovation (e.g. Van Der Vegt and Bunderson, 2005). Questioning one's assumptions, underlying practices and procedures, may lead to feelings of vulnerability (e.g. Wiedenhof and Molenaar, 2006) and the idea of failure. So a safe climate wherein 'faults' are tolerated and learning can take place is an important antecedent for learning (see also Van der Vegt and Bunderson, 2005). Social psychological research shows that a positive interdependence between parties is an important predictor of an open and safe climate wherein people are open to new views and to the integration of ideas (e.g. Deutsch, 1973; Tjosvold, 1998). So unless people are not dependent on each other in terms of achieving their goals or performing tasks, learning from each other will not easily take place. Resources, e.g. time and money, are another important prerequisite for learning (Camacho Tuckeman, 2007; Fischer et al., 2009; Sinclair et al., 2008). If people don't have the time to reflect, they will choose the 'easy' way and jump into another project without evaluating on former projects. But also access to information flows (Sinclair et al., 2008) and knowledge management processes are necessary conditions to make knowledge reproduction and creation possible (Powell, 2006). Finally, an important resource is a facilitator who has not only enough technical knowledge but is able to empower the local participants as well by focusing on local realities and enhancing local knowledge and capabilities (Hickey and Mohan, 2005; Runhaar et al., 2010). The central hypothesis in this paper is that donors providing project-level EIA support may actually play a facilitator role in enhancing system-level learning (Fig. 1).

3. Research design

3.1. Methodology

In view of the exploratory nature of our research, our empirical analysis is based on a comparative case study. We have chosen to focus on two countries: a low income country (Ghana) and a medium income country (Maldives). At the request of these countries, the NCEA had recently provided project advice for various EIAs. Contacts established by the NCEA and knowledge acquired by NCEA employees in addition facilitated our data collection. The two LMCs vary regarding economic development, geophysical characteristics and institutional context, which facilitate the exploration of contextual factors stimulating or impeding (the influence of donor interventions on) 'indirect' learning (see Table 1). Within the two countries five EA projects that received project-level support from the NCEA were analysed. The following criteria were employed to select projects:

- Scope for learning. System level learning effects were expected to be more apparent in the case of large projects, projects that were rather new to the local EIA key actors, and projects that received international attention;
- Explicit involvement of the NCEA in terms of advice on terms of reference of the EIA, advice on the assessment results (EIS) and on monitoring and enforcement;
- Project interventions that have been finalised not more than ten years ago in order to be able to collect primary and secondary data.

As we were particularly interested in the extent to which project level donor interventions promote learning at EIA system-level, we have tried to isolate the contribution of the NCEA to indirect learning by comparing the results of the analyses of the aforementioned projects with various other EIA projects that did not receive international assistance of any kind. For this purpose we asked our informants to reflect on learning experiences in projects that were similar to the NCEA-projects but that did not receive NCEA support. By interviewing



Fig. 1. Analytical model.

Table 1

Country characteristics and the state of the national EIA system.

Country: variable:	Ghana	Maldives
Geography Political org. GDP per capita ¹	West-African country: 239.460 sq km. Constitutional democracy \$716 (Low Income Country)	Archipelago of atolls in the Indian Ocean; 1190 coals island (app. 200 inhabited). Constitutional democracy with a Presidential system of government \$3.649 (Middle Income Country)
Current	Recurrent droughts	Depletion of freshwater aquifers
environmental issues	Deforestation	Global warming and sea level rise
	Overgrazing	Coral reef bleaching
	Soil erosion	
	Poaching and habitat destruction	
	• Water pollution and inadequate supplies of potable	
FIA nonviotions	Water	Environmental Distortion Act (4/1002)
EIA regulations	-National Environmental Action Plan (1989; to control the environment via EIA)	-Environmental Protection Act (4/1993)
	-National Environmental Policy (1991)	-FIA regulations 2007
	-Environmental Protection Agency Act (EPA Act 490	En regulations 2007
	December 1994)	
	-Ghanaian Environmental Assessment Regulations (LI	
	1652, 1999)	
	-Formal Sector Guidelines (2008)	
EIA authority	Environmental Protection Agency (succession of	Environmental Protection Agency (full EIA authority since 2008. Before 2008 the
	Environmental Protection Council founded in 1974)	Ministry of Environment was the main authority)
Themes of most	-Oil and gas exploration and exploitation	-Land reclamation and reconstruction
EIAs/SEAs	–Mining projects	-Tourist resorts, including hotels
Mast supersut	Louislations	-Waste management and power generation
Most apparent	Legislation:	Legislation
EIA-system bottlenecks	effective in practice.	 regulative namework, more regary binding rules and regulations needed, Generic frameworks for EIA procedures, guidelines and a penalty act are strikingly missing
	Canacities:	Canacities
	1. Capacity and confidence of EIA authorities in large and	1. EIA follow-up: no or little field inspections, monitoring and compliance enforcement:
	complex projects;	······································
	2. Organisational memory of EIA authorities (e.g.	2. Weak institutional structures for EIA/SEA ² ;
	structural archiving of information);	
	3. Availability, accessibility and dissemination of	4. Availability, dissemination and transparency of information;
	information and knowledge;	
	4. Monitor and Evaluation processes;	5. Cooperation and coordination with CSOs in general, and NGOs in particular;
	5. Inspecting and enforcing compliance;	6. Continue high priority for sustainability issues, i.e. long term vision for (large scale)
		projects including economic, social and environmental interests. ³
	6. Cooperation with NGOs;	/. Kesource limitations
	7. Integration of EA in other ministerial divisions;	
	o. weak mouvation and skins ErA personnel; 9 Resource limitations	
	s, resource miniations.	

¹Source: IMF World Economic Outlook Database.

²It is necessary to formalise EIA procedures, create mechanisms for organisational memory and enhance capacity of staff and organisations.

³Now the least environmental impact as defined by actors in a dominant economic/political context is an accepted goal; large projects hardly ever get disapproved solely because of environmental concerns.

⁴The EIA was specifically about phase 1, which consisted of subsea oil and gas production wells connected to a Floating Production Storage and Offloading vessel (FPSO) permanently moored in the Jubilee Field.

⁵The Netherlands bank for development (FMO) granted financial support for the projects on a fifty percent loan and fifty percent donation basis. The bank requested the NCEA to assess the quality of several EIA outputs and provide recommendations for follow up, as a safeguard for their financial assistance.

⁶The construction works were performed under the heading of a "safe island strategy" (now: "resilient island programme"), a pre-tsunami policy framework planned to create resilient islands that could function as safe locations for Atoll residents in times of hard weather –e.g. storms or tsunamis–, and central places capable to cater for large populations.

the same respondents, we hoped to reduce biases due to the selection of respondents. When respondents had no experience with similar projects, we asked them to reflect on hypothetical projects with comparable characteristics except for the NCEA support.³

Apart from interviews with EIA authorities, officials of various Ministries and Governmental Institutes, NGO representatives and NCEA employees (semi structured), we analysed project documents. We thereby primarily focused on what actors considered as learning experiences (i.e. 'perceived learning'). Our observations and interpretations were validated by means of group discussions with national EPA employees and representatives of civil society organisations (CSOs) and other project stakeholders.

3.2. Introduction to the case studies

3.2.1. Country profiles

The Ghanaian EIA system is older than the system in the Maldives. The precedent of the Environmental Protection Agency (EPA) became the first governing body in Africa to focus on issues of environmental management (cf. Appiah-Opoku, 2001). EIA regulations are quite elaborate and even specified per sector since 2008. The Maldivian system was upgraded in 2007 when EIA regulations were officially – though far from exhaustive– defined, and after the political reelections in 2008 when the formal EIA authority was assigned to the EPA.⁴ Still the regulatory framework is fragile; general guidelines are defined but did not pass court judgement due to lacking translations into local vernacular, and generic frameworks and regulations

³ Cases with and without NCEA are never completely comparable. The NCEA usually is involved in large and complex projects where some knowledge and experience on the side of the recipient key actors is lacking.

⁴ This means that the agency has the power to define the threshold for EIA projects, including the performance obligations, the compliance measures and the penalties when actors do not abide with the rules and regulations.

Table 2

The Ghanaian EIA cases.

	1. Ankobra Petrochemical Plant (2001)	2. West African Gas Pipeline (2004)	3. Jubilee Oil Field Phase 1 (2009)			
Initiator	Consortium of American and UK-based enterprises, together with GoG.	West African Pipeline Company Ltd. (WAPCo); consortium of Chevron Texaco Ltd, Nigerian National Petroleum Corporation, Shell Overseas Holding Ltd, and the Volta River Authority.	Jubilee Joint Venture; Tullow Ghana Limited and its joint venture partners Kosmos Ghana HC (Kosmos), Anadarko WCTP Company, Sabre Oil and Gas, the EO Group, and the Ghana National Petroleum Corporation (GNPC)			
Objective	140.000 Barrels per day crude oil refining and petrochemical unit in the Sekondi Export Processing Zone, to meet national and international needs for crude oil.	To manage the Ghanaian part of the offshore and onshore gas pipeline transmission system that was planned to deliver natural gas from the Nigerian wells to commercially viable markets in Benin, Togo and Ghana.	The development of hydrocarbon resources within the Jubilee Field, an oil and gas reserve located off shore in the Western Region. The processed crude oil would be stored in storage tanks and offloaded to oil tanker vessels for delivery to international markets approximately every 7 to 10 days. ⁴			
EIA Authority	Environmental Protection Agency (EPA)	EPA	EPA			
EIA output	1. Preliminary Environmental Assessment (PEA)	1. PEA	1. PEA			
	2. Terms of Reference (ToR)	2. ToR	2. ToR			
	3. Environmental Impact Statement (EIS)	3. EIS	3. EIS			
		4. Addendum				
NCEA output	1. Advisory Review (AR) of preliminary EIS	 AK of preliminary EIS Advice on addendum Advice on permit conditions 	 Secretary advice[*] on preliminary EIA *formal reaction to the quality of the EIS via e-mail briefing. 			
	\rightarrow plus discussions with two EPA members at NCEA office and visits to refineries in the Netherlands.	→ approach signified a Joined Review Process (NCEA + EPA staff), a site visit and stakeholder consultations.				
Decision	Based on comments of the NCEA the EPA demanded the initiator to amend the EIS with various details about environmental and social impacts. Subsequently the initiator cancelled the project.	Permit granted, conditions based on outcomes of EIA, including comments of the NCEA.	Approval for phase 1 granted, conditions based on outcomes of EIA including comments of the NCEA (which were integral included in the EPA review document).			
Direct	• Technical requirements for the EIS of oil and gas	initiatives;				
project level	• Manners to recognise environmental priorities in	large scale oil and gas endeavours;				
learning • (possible) Environmental impacts of oil and gas exploitation;						
	Mitigation and compensation measures to protect the environment.					

¹Source: IMF World Economic Outlook Database.

²It is necessary to formalise EIA procedures, create mechanisms for organisational memory and enhance capacity of staff and organisations.

³Now the least environmental impact as defined by actors in a dominant economic/political context is an accepted goal; large projects hardly ever get disapproved solely because of environmental concerns.

⁴The EIA was specifically about phase 1, which consisted of subsea oil and gas production wells connected to a Floating Production Storage and Offloading vessel (FPSO) permanently moored in the Jubilee Field.

⁵The Netherlands bank for development (FMO) granted financial support for the projects on a fifty percent loan and fifty percent donation basis. The bank requested the NCEA to assess the quality of several EIA outputs and provide recommendations for follow up, as a safeguard for their financial assistance.

⁶The construction works were performed under the heading of a "safe island strategy" (now: "resilient island programme"), a pre-tsunami policy framework planned to create resilient islands that could function as safe locations for Atoll residents in times of hard weather –e.g. storms or tsunamis–, and central places capable to cater for large populations.

are still under construction at the time of writing. Table 1 below presents the country profile in more detail.

3.2.2. The Ghanaian and Maldivian cases

Tables 2 and 3 below summarise the selected EIA cases in Ghana and the Maldives. Both tables also include the lessons learned at the project level. The extent to which these projects have resulted in indirect learning at system level will be discussed in Section 4.

4. Evidence of and explanations for indirect system-level learning

In this section we will describe and explain system-level learning effects evoked by the above outlined NCEA supported EIA projects. Since we were particularly interested in the effects of donor promoted learning loops, in Section 4.2 we compare system level learning in projects with and without NCEA support. In Section 4.3 we compare the explanations for observed 'indirect' learning as indicated by our respondents with the theoretical promoting factors discussed in Section 2.2.

4.1. Indirect system-level learning in practice

Below we summarise the learning effects and explanations provided by our respondents.

• Enhanced awareness of and capacity for full EIA processes;

The EIAs and NCEA comments in particular triggered more

attention and awareness for the procedural outline of a full EIA performance. Focal points of attention in the NCEA advisory reports that were recognised by recipients were: manners to include more stakeholders and organise public participation, translate technical project details in the EIA documents, prioritise review outcomes, define relevant mitigation and compensation measures, and control the length and language of the EIS and M&E reports. Moreover, due to the international donor aid the EIAs were taken more serious by the respective authorities and project initiators compared to projects where such assistance was lacking. This in turn augmented the confidence of the technical review committees responsible for the review of the EISs, especially in the cases where the NCEA closely operated together with the TRCs, like they did in Ghana for the WAGP project.

• Awareness and attention for EA integration in planning (SEA);

In their different advisory reports the NCEA repeatedly emphasised the need and relevance of SEA: in Ghana for the oil and gas sector as a whole and in the Maldives for the policy strategy of the safe/resilient island network. The NCEA explained the gaps in knowledge of actors and omissions in preliminary EIA reports mainly in terms of a lacking assessment on the level of policy planning and design. In the Maldives, actors responsible for policies acknowledged that they did not read (or solely screened) the EIA reports due to ignorance or a lack of time; hence the EIA outcomes were not consciously taken into account at the strategic level. Still, the Maldivian government recently ordered the EPA to initiate a generic framework for SEA. NCEA reports

Table 3 The Maldivian EIA cases.

-			
		Vilufushi (Thaa Atoll)	Villigili (Gaafu Alifi Atoll)
	Initiator ⁵	Maldivian Ministry of Finance and the Ministry of Planning and Development.	Maldivian Ministry of Finance and the Ministry of Planning and Development.
	Objective ⁶	To enlarge existing land, partial levelling and the construction of a bund wall (revetment) for protection against sea level rise and high waves.	To enlarge existing land, partial levelling and the construction of a bund wall (revetment) for protection against sea level rise and high waves.
	EIA Authority	The Ministry of Environment and Construction.	Ministry of Energy, Environment and Water (now: Ministry of Housing and
	-	-	Environment).
	EIA output	1. IEE	1. IEE
		2. ToR	2. ToR
		3. EIS	3. EIS
		4. SIA	
	NCEA output	1. Review of IEE	1. AR on preliminary EIS
		2. Advice on ToR	2. Advice on EMP
		3. AR of preliminary EIS	
		4. Advice on SIA	
		\rightarrow Plus site visit by expert group	
	Decision	The Ministry of Environment and Construction granted approval after a	The decision statement was issued by the Ministry of Energy, Environment
		satisfying completion of the EIA study.	and Water after completion of the EIA study.
	Direct project	 Technical requirements for the EIS of reclamation projects; 	
	level	 Manners to recognise priorities for environmental protection; 	
	learning	 Measures to mitigate negative impacts due to land reclamation; 	
		 Environmental impacts of land reclamation and development. 	

¹Source: IMF World Economic Outlook Database.

²It is necessary to formalise EIA procedures, create mechanisms for organisational memory and enhance capacity of staff and organisations.

³Now the least environmental impact as defined by actors in a dominant economic/political context is an accepted goal; large projects hardly ever get disapproved solely because of environmental concerns.

⁴The EIA was specifically about phase 1, which consisted of subsea oil and gas production wells connected to a Floating Production Storage and Offloading vessel (FPSO) permanently moored in the Jubilee Field.

⁵The Netherlands bank for development (FMO) granted financial support for the projects on a fifty percent loan and fifty percent donation basis. The bank requested the NCEA to assess the quality of several EIA outputs and provide recommendations for follow up, as a safeguard for their financial assistance.

⁶The construction works were performed under the heading of a "safe island strategy" (now: "resilient island programme"), a pre-tsunami policy framework planned to create resilient islands that could function as safe locations for Atoll residents in times of hard weather –e.g. storms or tsunamis–, and central places capable to cater for large populations.

are used again as reference materials. In Ghana the NCEA suggestions for a SEA of the entire oil and gas sector during both the WAGP and the Jubilee Field projects accelerated its recent development, despite an initial reluctance of Ghanaian authorities who believed that their EIA system is "the strongest one in Africa."

• Development of a regulatory framework for EIA;

International attention for the EIAs in both countries triggered some awareness about the importance of EIA regulations. In Ghana experiences with the NCEA empowered the already initiated efforts to decentralise EA authority. In the Maldives lessons were more apparent: the EPA and the Ministry of Housing and Environment are currently working on an extended set of rules and regulations for EIA, including more specific guidelines and generic frameworks for EIA processes such as terms of reference (ToRs) or EISs. The Vilufushi and Viligili EIAs together with the NCEA comments are used by EPA members as a "golden standard" for they are considered as examples of international best practices. In addition, NCEA comments about an Environmental Monitor Plan (EMP) raised awareness about the importance of monitoring. This led to the formulation of the EMP as a legal requirement.⁵

 Attention for and awareness about participation and information dissemination;

The EIAs including the NCEA advisory contributions evoked awareness and attention (e.g. discussions) for the execution and quality of participation performances in EIA, and for the (importance of) dissemination of information. During the Ghanaian projects with NCEA support more consultation meetings were executed compared to projects without NCEA support — although this may be attributed to the size of the projects as well. The emphasis of the NCEA on open participation, inclusion, and dissemination of information evoked discussions about the manner the EIAs were performed. Where EPA members considered frequent consultative meetings as signs of inertia –"all the meetings were a little too much; no new ideas are mentioned and it does not seem to match our effort"– NGOs openly stated that information was insufficient,⁶ too technical or unclear due to a lacking translation into local knowledge. NGOs declared that they would like to have access to permits, permit conditions and the EIA review comments more easily and on a regular and structural basis. Moreover, baseline information and quantification of mitigation and compensation measures should be present and specified in the final report to greater extents as well.⁷ The EPA disagreed with the dissemination allegations, although they acknowledged that structural data storage is a weakness despite their attempt to keep-up a library at their head office in Accra. This was illustrated by the extensive list of disclosure-related allegations that the World Bank Inspection Panel (IP) received for the WAGP project.⁸

Maldivian authorities learned about the importance of informing and including the public during different EIA stages. One learning outcome that was expressed during the Vilufushian group discussion was exemplifying: "Environmental Impact Studies done for reclamation and shore protection should be carried out with public consultation" (translated from local vernacular). NGOs are still critical about the manner public consultations are performed. They stated that the public is barely heard and that initiatives are presented rather than discussed with local residents: "Because the project characteristics are too technical the public, lacking sufficient knowledge, has no option to choose from. Simply because they do not know better" (NGO representative). Still, the Vilufushi and Villigili projects

⁵ At time of writing the EPA was asked by the MHE to make a list with all current projects that did not report on M&E, including government projects.

 $^{^{\}rm 6}\,$ E.g. one NGO claimed that the promised economic and financial analysis of the project was never disclosed.

⁷ In the Jubilee Field Project, for instance, a fishery liaison officer was appointed as part of the proposed mitigation measures that were approved by the EPA. However, no task description was provided which leads to misunderstandings and a failing practice to solve the problems at hand.

⁸ See for more information: *Transparency violations common theme for World Bank Inspection Panel* (Bank Information Centre 2009). Available at: http://www.bicusa. org/en/Article.11138.aspx.

accelerated attention for public consultations. Emerging capacity and regulations now need to enhance current performances.

- Awareness of environmental management and assessment in general; Awareness about the importance to pay attention to (i.e. monitoring) the development of corals, currents, sand movements and other island forming processes in the Maldives was accelerated by the EIAs for the Vilufushi and Villigili projects. Currently on Vilufushi, more attention is paid to waste management (also to fight breeding spaces of mosquitoes) and the maintenance of the environmental protection zone, the revetment and the harbour area. Attention for environmental management was triggered by the manner mitigation measures were implemented during the dredging works, measures that were accounted for in the EIAs and the NCEA reports. New plans⁹ for the island that are being developed to date are all accompanied with enviconsiderations ronmental ("environmental re-assessment"). Statements of different ministerial authorities about the importance of environmental management and the (mandatory) inclusion of EIA procedures in Ghana also reflect awareness about these issues. • *Empowerment of local governance and decentralisation*;
- The temporary 'training on the job' activities during the NCEA review period of the WAGP EIA in Ghana enhanced understanding of sound review processes. Notwithstanding, the final review comments of the NCEA did comprise comments on the review process and the EPA review team. This caused, as was proven by statements in the interviews, more awareness of the importance and possibilities of reviewing. Subsequently, the decentralisation of the EPA administration commenced to include district review and audit bodies as well. The EIA and the reclamation and reconstruction projects on Vilufushi and Villigili did empower local governance on the islands, including CSOs (atoll and island chiefs) and NGOs, to some extent. Although no full recognition is achieved yet, local voices and powers are gradually regarded as important and consultation has become a more prominent issue in the planning of development projects. Given the recent decentralisation and democratisation of governance in the Maldives, actual implementation of lessons learned about local governance seems promising.

4.2. Comparing indirect learning in EIAs with and without NCEA support

Ghanaian authorities stated on the one hand that their knowledge and experience with EIA was already rather extensive and that they did not encounter striking differences in projects with or without NCEA help. On the other hand, most experts and EPA members acknowledged that NCEA input taught them about technical project issues (e.g. pipeline routes or offshore refinery constructions) and the manners to translate them into sound EIA processes. Awareness about essential EIA requirements for large scale oil and gas projects was created, which according to some EIA authorities "accelerated" and supported the development of a SEA for this sector. Furthermore, in projects without NCEA assistance EIA authorities, and TRC members in particular, were less confident to forward environmental interests in multi-stakeholder dialogues. With the NCEA they learned how to focus and prioritise essential issues, and forward subsequent demands -- "the referee [NCEA, red.] tells us whether we do a good job or not, and that helps." Compared with other EIAs, the Maldivian projects with NCEA assistance seem to be performed with more environmental care for they are based on an EIA of higher quality and detail. Mitigation, participation and compensation measures received more elaborate attention. The presence of international actors, including the NCEA, resulted in a kind of "watch-dog policy" (EPA member) that determined sound environmental behaviour of the contractor to a great extent: "Without such NCEA comments the contractors do not care that much. They know somebody is looking over their shoulder, so they need to behave conform international standards or at least to the agreements that were made based on the EIA" (EA expert). Maldivian authorities, in turn, learned how to formalise and strengthen their authority, based on more detailed demands for EIA performances. Respondents in both Ghana and the Maldives stated moreover that the attention and awareness for follow-up issues on the project level is higher in projects with external support, which leads to a better (assumed level of) compliance in practice -- "such EIAs define the baseline for compliance; in other projects contractors tend to forget to monitor"- and more abidance to the regulations: "There are also good EIAs in projects without NCEA aid, but often contractors don't abide by our regulations to the fullest extent" (EIA authority). According to another authority the presence of the NCEA even safeguards an actual execution of the EIA: "In projects without international attention -or NCEA advisory commentscontractors behave differently. They would not leave any stone unturned to avoid an EA. They do their utmost best to argue why the project doesn't need an EIA, instead of just performing one." In short, when we compare indirect system-level learning effects coming from NCEA supported EIAs with projects that lacked external support we notice that, although differences remain relatively little, EIAs with NCEA input evoke more significant indirect learning effects, both in terms of single loop learning (i.e. awareness about technical EIA requirements including mitigation, participation and review issues) and double loop learning (i.e. the institutionalisation of EIA procedures and attention for SEA). This in turn indicates that facilitators indeed play an important role in stimulating learning (Table 4).

4.3. A comparison of observed and theoretical explanations for indirect learning

Throughout this section we discussed explanatory factors for 'indirect' learning at system level, as experienced by our respondents. Table 5 provides a tentative assessment of the relative importance of theoretical explanations discussed in Section 2. The learning effects in practice seem to depend heavily on the attitude and willingness of the local agents, and the EPA in particular, to learn. As the cases suggest, the NCEA assistance needs to be recognised as a learning opportunity, and the NCEA as an agent to learn from, for learning mechanisms to emerge. Our assessment of the role of the NCEA shows that facilitators seem to be important in promoting indirect learning as well. When "facilitating learning" is no aim of a donor such as the NCEA, indirect learning effects might remain absent.

5. Conclusions and discussion

5.1. Conclusions

Based on our research in Ghana and the Maldives we conclude that, in general, the influence of indirect learning loops running from project experiences towards the EIA system in LMCs, both in terms of single and double loop learning, is moderate. Donors contribute to indirect learning, but their influence remains moderate as well. Most of the lessons learned were single-loop rather than double-loop, at individual rather than at organisational level. Manners to prioritise specific environmental issues, draft effective terms

Table 4

Cross-comparison of learning effects and donor influences.

	With NCEA		Without NCEA	
	Legislation	Capacities	Legislation	Capacities
Single loop Double loop	Little Moderate	Moderate Moderate	Little Little	Little-moderate Little

⁹ There are discussion about expansion of the harbour, the creation of a recreation area on the newly northern sandy area, an extension of fish market, the creation of commercial port and a distribution centre (all plans are still in draft phase).

1	a	b	le	5	

Theoretical promoting factors and their importance in the cases examined.

		Ghana +	Ghana —	Maldives +	Maldives —
Individual characteristics	Capabilities	Little-moderate	Little	Moderate	Little-moderate
	Sense of self-efficacy	Moderate-extensive	Moderate	Moderate	Little
	Commitment	Little-moderate	Little	Little-moderate	Little-moderate
	Willingness	Little	Little	Extensive	Moderate
Contextual characteristics	Group diversity	Moderate	Little	Extensive	Little
	Climate	Moderate	Little-moderate	Little	Moderate
	Resources	Little	Little	Little-moderate	Little
	Access to information flows	Little-moderate	Little	Little-moderate	Little
	Knowledge management processes	Little-moderate	Little	Little	Little
	Facilitator	Moderate	Little-moderate	Moderate	Little-moderate

+ = with NCEA support.

- = without NCEA support.

of reference and define proper mitigation and compliance measures were most the apparent single-loop learning effects. Awareness of EIA integration in planning and knowledge about weak EIA system elements were the most apparent double-loop learning effects. However, the significance in time of these results at the system level is yet unclear for most lessons are restricted to a raised awareness of individuals about system level malfunctions. Profound knowledge about manners to improve these malfunctions -the modus operandi- is strikingly lacking and was not entirely resolved by the NCEA project contributions. Hence, in most cases there was no full learning experience as defined in Section 2. Moreover, the 'indirect' lessons did not cover all system deficiencies (see Table 1): Although the lessons encompass issues of participation, inclusion, procedural outlines, EIA content, policy and (to some extent) monitoring, nothing or little was learned about the post-EIS activities such as compliance control and enforcement, and manners to disseminate and archive information properly and transparently. Cooperation with CSOs (including NGOs) could be given more attention as well. Although learning mainly took place at individual level, influenced by individual characteristics such as willingness to learn, explanations for indirect learning -and the absence thereof- seem to relate primarily to the (institutional) context, constituted in part by factors other than derived from the literature. In Ghana the context was characterised by a rather developed EIA system with a clear and powerful mandate for the EPA, including their regional offices, and legal EIA regulations and guidelines in place. Experience with EIAs and even SEA was and still is growing, leading to a general shared belief that a strong national EIA institutional set-up was present that did not need to foster significant learning effects i.e. a weak willingness to learn. As a consequence knowledge management processes and access to information flows were rather moderate as well. In contrast, Maldivian key actors did not belief a strong EIA system was in place. During the post-tsunami projects no EIA regulations were defined and the EPA had little power. Accountability for environmental management was unclear, as was ownership due to the various stakeholders involved (including the international parties). This resulted in a low commitment and instable climate wherein learning could take place. In addition, no professional institute was actively involved in both EIA and post-EIA practices, and extensive post-tsunami donor aid generated a political climate where socio-economic issues where favoured above environmental issues. Therefore, indirect learning outcomes were hard to take up due to this constraining institutional context where no organisation fostered possible learning outcomes; a lot of information was lost due to weak information management (no proper archiving of data). Ignoring (the potential of) "indirect" learning effects means that opportunities for EIA system enhancements that fit the local contexts remain invisible. Opportunities for "indirect" learning should be unveiled to promote enhanced system developments, but how? Our research indicates that indirect learning flourishes best in large projects -i.e. major investments with comprehensive societal impacts- where different stakeholders participate and donor agencies play an apparent and important role (as "the big brother standing behind

us"). This context enables a position of influence for donors (c.f. Bitondo and André, 2007) that they can use to empower "indirect" learning loops, for instance by emphasizing reflection upon system malfunctions, embed the isolated event in a programme of structural EIA optimisation,¹⁰ and/or structure the EIA processes along the outline of the World Bank learning spiral (see Blindenbacher, 2010). Conditions for learning, as introduced in this paper, can guide donor actions further. It is thereby important that donors present the advice elaborately -e.g. ensure a larger audience (including NGOs, community leaders, other ministries and the project proponent), and discuss the outcomes during a face-to-face presentation in order to prevent translation and interpretation errors. Furthermore, advisory reports of donors could include examples of other international projects, relate current issues with past advisory notes or projects, and articulate concrete suggestions about post-EIS activities (licence issues, monitoring procedures, inspection/ enforcement options) and the institutional integration of the EIA (regulatory framework, accountability, authority, interaction with other ministries). Finally, donors might need to stimulate the use of their advisory reports (or other outcomes of their intervention). To forward the report as an example of international best practice helps. More contact in the period after issuing the report -e.g. via a discussion forum or blog-, more guidelines to facilitate organisational learning (to safeguard institutional memory) and more emphasis on the importance of information dissemination (including the review comments and permit conditions) might ameliorate the significance of indirect learning on the EIA system level as well.

5.2. Discussion

The exploratory nature of our analysis implies that our findings are indicative and not necessarily representative of other projects in the countries examined or other LMCs. Our results in terms of learning outcomes coincide with earlier assessments (e.g. Fischer et al., 2009). Yet, the case studies suggest that the relevance of factors that promote (or impede) learning is context-specific. More research into the explanation of indirect learning is therefore required, in particular concerning 'levels of learning' beyond awareness.

References

- Adler PS, Kwon S. Social capital: prospects for a new concept. Aca Manage Rev 2002;27 (1):17–40.
- Ali OMM. Policy and institutional reforms for an effective EIA system in Sudan. J Environ Assess Policy Manage 2007;9:67–82.
- Alshuwaikhat HM. Strategic environmental assessment can help solve environmental impact assessment failures in developing countries. Environ Impact Assess Rev 2005;25(4):307–17.
- Appiah-Opoku S. EIA procedure. Environmental impact assessment in developing countries: the case of Ghana. Environmental Impact Assessment Review, No. 21. Elsevier Science Inc.; 2001. p. 59–71.

¹⁰ The learning on the job-activities of the NCEA during the WAGP-project and the Jubilee Field Phase 1-project are good examples here.

Argyris C. Double loop learning in organisations. Harv Bus Rev 1977:115–25. September-October.

Argyris C, Schon DA. Organizational learning: a theory of action perspective. Philippines: Addison-Wesley publishing company, Inc.; 1978.

- Argyris C, Schön D. Organizational learning II: Theory, method and practice. Reading, Mass: Addison Wesley; 1996.
- Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev 1977;84:191-215.
- Bitondo A, André P. Contextual phases in the institutionalization of the environmental assessment of road development in Cameroon. Impact Assess Project Appraisal 2007;25(2):139–48.
- Blindenbacher R. The black box of governmental learning. The learning spiral a concept to organise learning in governments. Washington DC: World Bank; 2010.
- Blumberg M, Pringle CD. The Missing Opportunity in Organizational Research: Some Implications for a Theory of Work Performance. Acad Manage Rev 1982;7(4): 560–9.
- Cashmore M, Bond A, Cobb D. The role and functioning of environmental assessment: reflections upon an empirical investigation of causation. J Environ Manage 2008;88 (4):1233-48.
- Cherp A. EA legislation and practice in Central and Eastern Europe and the former USSR: a comparative analysis. Environ Impact Assess Rev 2001;21(4):335–62.
- Cherp A, Antypas A. Dealing with continuous reform: towards adaptive EA policy systems in countries in transition. J Environ Manage 2003;5(4):455–76.
- Deutsch M. The resolution of conflict. New Haven, CT: Yale University Press; 1973.
- EPA (no date) Environmental Impact Assessment (EIA) Requirements in Ghana –The Pathfinder to Sustainable Development. EPA Accra.
- Fischer Thomas, Kidd Sue, Jha-Thakur Urmilla, Gazzola Paola, Peel Deborah. Learning through EC directive based SEA in spatial planning? Evidence from the Brunswick Region in Germany. Environ Impact Assess Rev 2009;29(6):421–8.
- Fitzpatrick P, Sinclair AJ. Learning through public involvement in environmental assessment hearings. J Environ Manage 2003;67(2):161–74.
- Hickey S, Mohan G. Relocating participation within a radical politics of development. Dev Change 2005;36(2):237–62.
- Jha-Thakur U, Gazzola P, Peel D, Fischer TB, Kidd S. Effectiveness of strategic environmental assessment – the significance of learning. Impact Assess Project Appraisal 2009;27(2):133–44.
- Joy S, Kolb DA. Are there cultural differences in learning style? Int J Intercultural Relations 2009;33(1):69–85.
- Kolb DA. Experiential learning: experience as the source of learning and development. New Jersey: Prentice-Hall; 1984 (0 13 295261 0).
- Kolhoff AJ, Runhaar HAC, Driessen PPJ. The contribution of capacities and context to EIA system performance and effectiveness in developing countries: towards a better understanding. Impact Assessment and Project Appraisal, 27(4). ; 2009. p. 271–81. December 2009.
- Mainemalis C, Boyatzis RE, Kolb DA. Learning styles and adaptive flexibility: testing experiential learning theory. Manage Learn 2002;33(1):5-33.
- Modak P, Biswas AK. Conducting environmental impact assessment in developing countries. United Nations: University Press; 1999.
- Nilsson M. The role of assessments and institutions for policy learning: a study on Swedish climate and nuclear energy formation. Policy Sci 2005;38(4):225–49.
- Pahl-Wostl C, Hare M. Processes of social learning in integrated resources management. J Community Appl Psychol 2004;14(3):193–206.
- Powell M. Which knowledge? Whose reality? An overview of knowledge used in the development sector. Dev Pract 2006;16(6):518–32.
- Robinson M, Bond A. Investigation of different stakeholder views of local resident involvement during environmental impact assessments in the UK. J Environ Assess Policy Manage 2003;5(1):45–82.
- Runhaar H, Driessen PPJ. What makes strategic environmental assessment successful environmental assessment? The role of context in the contribution of SEA to decision-making. Impact Assess Project Appraisal 2007;25(1):2-14. March 2007.
- Runhaar H, Runhaar P, Oegema T. Food for thought. Conditions for discourse reflection in the light of environmental assessment. Environ Impact Assess Rev 2010;30(6): 339–46.
- Sankoh O. Making environmental impact assessment convincible to developing countries. J Environ Manage 1996;47(2):185–9.
- Schneider B. The people make the place. Personnel psychology 1987;40(3):437–53. Sinclair AJ, Diduck A, Fitzpatrick P. Conceptualizing learning for sustainability through
- environmental assessment: critical reflections on 15 years of research. Environ Impact Assess Rev 2008;28(7):415–28.

- Tjosvold D. Cooperative and competitive goal approach to conflict: accomplishments and challenges. Appl Psychol 1998;47:285–313.
- Valve H. Frame conflicts and the formulation of alternatives: environmental assessment of an infrastructure plan. Environ Impact Assess Rev 1999;19(2):125–42. Van Der Vegt G, Bunderson J. Learning and performance in multidisciplinary teams: the
- importance of collective team identification. Acad Manage J 2005;48(3):532–47. VandeWalle D, Ganesan S, Challagalla GH, Brown SP. An integrated model of feedback
- seeking behaviour: disposition, context and cognition. J Appl Psychol 2000;85: 996-1003. Van Loon L, Driessen PPI, Kolhoff A, Runhaar HAC. An analytical framework for capacity
- Van Loon L, Driessen PPJ, Kolhoff A, Runhaar HAC. An analytical framework for capacity development in EIA - the case of Yemen. Environ Impact Assess Rev 2010;30(2): 100–7.
- Verbeeten T. Wijsmet deWaddenzee? Een onderzoek naar leerprocessen (Policy learning in the Wadden Sea case; in Dutch). Ph.D. thesis, Utrecht: Utrecht University; 1999.
- Weick C. Making sense of the organization. Oxford: Blackwell publishing; 2001.
- Wiedenhof C, Molenaar H. One never knows. Research policy and knowledge management in Dutch development cooperation. Knowledge Management for Development Journal 2006;2(3):5-18.
- Wood C. Environmental impact assessment. A Comparative Review2nd ed. Harlow: Prentice Hall; 2003.

Amos A. de Jong MA MSc studied Cultural Anthropology and Development Sociology at the University of Leiden, and Sustainable Development at the University of Utrecht. For the Netherlands Commission of Environmental Assessment Amos performed research and consultancy tasks in the Netherlands, Ghana and the Maldives. Amos is currently working as a consultant for Innovation Management in the Netherlands.

Since 2003, dr Hens Runhaar has been an assistant professor at Utrecht University, Section of Environmental Governance. In 1994 he graduated from Twente University where he studied Public Administration. Between 1994 and 1998 Hens worked as a researcher at the Erasmus University Rotterdam and at AGV Consultancy for transport and traffic studies. In 1998 he started a Ph.D. project on the effects of transport costs on paper logistics. He received his Ph.D. in 2002 from Delft University of Technology. His current research focuses on the role of knowledge in decision-making.

Dr Piety Runhaar is an assistant professor at the Wageningen University, Department of Education and Competence Studies. She has a background in psychology and obtained her PhD degree from the University of Twente in 2008. Her research focuses on professional development of teachers, in terms of informal learning during work in interaction with colleagues. Until 2008 she combined doing research and teaching with working as consultant at KPC Group, a consultancy firm with a focus on improving learning processes within schools and other companies. She helped schools with implementing HRM policy, facilitating change processes and stimulating learning of teachers within teams.

Arend Kolhoff MSc is senior technical secretary at the international department of the Netherlands Commission for Environmental Assessment. He is currently working on a PhD research project which aims to identify guiding principles for the development of better performing EIA systems in developing countries. He has a degree in human geography from Utrecht University. He has fifteen years working experience with the Commission in about twenty countries as trainer and advisor on EIA and SEA capacity development activities.

Prof. Dr. Peter P.J. Driessen is a professor of Environmental Studies. He graduated in urban and regional planning from Nijmegen University. In the last 15 years he worked successively as a researcher, as director of education, and as head of the department of Innovation and Environmental Sciences, Utrecht University. His research focuses on environmental planning and interactive governance. Currently, he is scientific director of the Dutch national research programme on climate change and adaptation strategies 'Knowledge for Climate'.