The role of Environmental Assessment (EA) in Iranian water management

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Abstract

In this paper, we reflect on the effectiveness of environmental assessment (EA for e.g. projects, policies, plans and programmes) in Iranian water management. Urmia Lake Basin (ULB) is used as a case study area and the extent to which EA appears to be delivering environmental protection objectives is established. Data was collected using document analyses, semi-structured interviews with local experts and site visits. It is established that activities are restricted to project level EIA (environmental impact assessment) and that EA is not able to address and mitigate the negative effects of extensive water exploitation through dam- and well building. Strengthening EIA legislation as well as introducing SEA is suggested as a possible way to address shortcomings, in particular with regards to addressing cumulative and wider basin effects.

Keywords: EA effectiveness, Water, Urmia Lake, Iran

1. Introduction

There is a growing professional international literature on Environmental Assessment (EA) effectiveness, covering both, Environmental Impact Assessment (EIA) of projects and Strategic Environmental Assessment (SEA) of polices, plans and programmes (Runhaar et al. 2013; Arts et al. 2012; Phylip-Jones and Fischer 2013; Fischer and Gazzola 2006). Whilst there is currently no consensus on what exactly EA effectiveness entails (Cashmore et al. 2004; Cashmore et al. 2009; Bond et al. 2017), various suggestions for conceptualization have been made (Bond et al. 2017). What is common to all suggestions is that effectiveness is associated with achieving intended objectives.

Existing attempts to measure effectiveness focus on different categories. In this context, Sadler (1996) first divided effectiveness into three categories: procedural, substantive and transactive (Theophilou et al. 2010; Chanchitpricha and Bond 2013; Bond et al. 2017). Following on from this, Baker and McLelland (2003) added normative effectiveness (Bond and Morrison-Saunders 2013; Chanchitpricha and Bond 2013). In addition, Bond et al. (2013) also added

learning (following e.g., Jha-Thakur et al. 2009a). Their reasoning was that a good EA should challenge existing values and ways of thinking of stakeholders about the environment, thus benefiting in particular future processes. Bond et al (2017) also added a pluralism category which assumes that a process is effective if affected and / or concerned parties are integrated into it (Bond et al. 2017). Table 1 summarizes and complements existing types of EA effectiveness categories.

Table 1: near here

Procedural effectiveness considers the principles of the EA process (Baker and McLelland 2003; Sadler 1996; Chanchitpricha and Bond 2013) while substantive effectiveness of EA assesses outcomes (Jay et al. 2007; Fischer 2009; Hapuarachchi et al. 2016). Substantive effectiveness investigates the extent to which EA helps to integrate environmental aspects into decision-making (Sadler 1996; Baker and McLelland 2003, Veronez and Montano 2015), leading to measurable change of the biophysical environment (Fischer 2018). Although EA effectiveness is context-specific (Arts et al. 2012), most EA provisions globally aim at procedural and substantive elements. To date little attention has been given to the overall context within which EA is happening (Fischer 2005). However, any review of effectiveness needs to consider the context in which EA operates in order to be meaningful (Morgan 2012; Sadler 1996; Bond and Pope 2012; Veronez and Montano 2015). Understanding context allows EA practitioners to have realistic expectations of EIA (Hilding-Rydevik and Bjarnadóttir 2007; Runhaar and Driessen 2007; Van Doren et al. 2013). Contextual influence was first discussed by Sadler (1996, p. 229) who suggested that '*emerging policy and institutional realities and broad societal changes*' are changing the context in which EA is operating (see also Marsden, 1998). Furthermore, Cherp (2001), Annandale (2001), Espinoza and Alzina (2001) underlined the importance of context when attempting to develop an understanding of the strengths and weaknesses of an EA system. This was subsequently further scrutinized by other scholars (see Fischer 2005, 2007; Runhaar and Drissen 2007; Bina et al. 2011; Arts et al. 2012; Van Doren et al. 2013; Hapuarachchi et al. 2016) and Momtaz and Kabir (2013) investigated effectiveness of EA systems in developing countries. As table 2 shows, there is no commonly accepted framework for contextual factors and there are differences, for example, between western style democracies and other countries.

Table 2: near here

The aim of this paper is to report on an examination of EA effectiveness within Iranian water management. In this context, Urmia Lake Basin (ULB) is used as a case study area. The remainder of the paper is divided into four sections. First, the context of the research underlying this paper is explained. Subsequently, the research methodology is presented, revolving around the application of an EA effectiveness framework. In sections 4 and 5 findings and conclusions are presented.

1.1. Setting the context:

1.1.1 Environmental Assessment (EA) in Iran:

In Iran the legal basis for project EIA is an article in the National Development Plan (NDP). NDPs are five-year codified programs drafted by the government and presented to parliament (Zaboli et al. 2016). EIA was first introduced in 1994 through Note 82 of the 2nd NDP (1994-1998) (Khosravi and Jha- Thakur 2018). According to this Note (1994, p.26): "*EIA reports should be provided during the feasibility and site-selection studies for any large projects*". Note 82 was then confirmed by Article 105 of the 3rd NDP (1999-2003), and Article 71 of the 4th NDP (2005-2009). Article 184 of the 5th NDP (2010-2015) focused on conducting EIA and also mentioned Strategic Environmental Assessment (SEA) of plans and programs at national and regional levels (Khosravi and Jha- Thakur 2018).

In the Iranian EIA process, once the proponents submit their developmental proposal to the relevant Department of Environment (DoE) provincial office, screening for EIA is undertaken based on a screening list (Moradi 2009). The EIA report consists of a description of the project, the surrounding environmental, social and economic conditions, law, regulations, potential impacts, mitigation measures, and the Environmental Management Plan. The report is submitted to the provincial EIA office for the initial approval from the provincial EIA committee. If approval is granted by the provincial EIA committee, the report is then forwarded to the EIA Bureau in the DoE at national level (Yousefi et al. 2015). The EIA committee reviews the EIA report and the presentation given by the proponent (for further details see Khosravi et al. 2018).

1.1.2 Water crisis in Iran:

Rapid economic development in Iran is associated with an increasingly serious water crisis. With regards to activities impacting on water, dam building is particularly significant. Iran ranks third in the world regarding the number of dams built after China and Japan (Madani 2014; Madani et al. 2016) and second with respect to construction of large dams after China. Many water bodies have been running dry as a result (Madani 2014). Lakes and wetlands such as Urmia, Hamoun, Gavkhouni, Parishan and Shadegan (Davtalab et al. 2014; Kaffashi et al. 2011) have seriously deteriorated due to short-sighted development projects (Madani 2014) and it is somewhat ironic that the collapse of Urmia Lake and other Iranian water bodies has occurred in the country where the Ramsar Convention was signed. As a pioneering intergovernmental treaty for conservation and sustainable use of wetlands, Ramsar envisaged action by both national governments and international co-operation (Guardian 2015).

However, water management problems are not restricted to surface waters. Iran is also currently amongst the most active groundwater miners in the world (Döll et al. 2014; Madani 2014). More than 55 percent of the total water demand in Iran is met through groundwater pumping to compensate for surface water deficits (Madani et al. 2016).

1.1.3 Urmia Lake Basin (ULB):

Urmia Lake is the largest saline lake in the Middle East. It is located in the north-west of Iran between the provinces of East and West Azarbayjan. It is the main habitat for the endemic Iranian brine shrimp, *Artemia urmiana*, and is a protected aquatic environment (Karbassi et al. 2010). The area has been registered under the Ramsar Convention as being of international importance for birds (AghaKouchak et al. 2015). Despite the unique characteristics of the lake, over the years, the area has undergone severe environmental changes. The status of Urmia Lake has significantly deteriorated, and continuation of the lake's retreat could lead to yet another major environmental tragedy like the fate of the Aral Sea (UNEP 2012; Small et al. 2001; AghaKouchak et al. 2015). The current extent of Urmia Lake is about one-tenth of its original size, creating one of the worst environmental tragedies in the Middle East (Alcamo et al. 2007; Hassanzadeh et al. 2012; Tisseuil et al. 2012; Stone 2015; Ashraf et al. 2017). “The basin is plagued with anthropocentric water resources development e.g., dams and diversions” (Ashraf et al. 2017, p. 6). Over-exploitation of input water to the lake is seen as the main driver of Lake Urmia's desiccation (AghaKouchak et al. 2015). The two primary anthropogenic drivers for the drying of the lake are construction of dams on the rivers feeding the lake and pumping of

groundwater by nearly 90,000 wells within the basin. There are 53 operational dams in ULB. Furthermore, 9 are currently being built and a further 27 are in the design stages (ULRP 2015).

Due to the deterioration of Urmia Lake, in 2013 the Iranian government announced a national plan named "Urmia Lake Restoration Plan" (ULRP) and later approved a budget of 5 billion dollars for the implementation of this plan (Guardian 2015; Shadkam 2017). This ULRP was approved as a ten-year plan, using six categories with 27 measures (ULRP 2016b; Shadkam 2017). Table 3 shows the water supply potential for the lake which has been identified by the ULRP.

Table 3: near here

Water management issues of ULB have been researched from various perspectives (See Ahmadaali et al. 2018; AghaKouchak et al. 2015; Govarchin Ghale 2018; Shadkam 2017; Soudi et al. 2017). However, to date no research has been conducted on the consideration of environmental issues during water resource planning processes.

2. Research methods

2.1. EA effectiveness framework

An EA effectiveness framework is used which has been developed based on a review of the international literature (See table 4). The main emphasis of the framework is on aspects of procedural and substantive effectiveness, as well as on context. P1 to P5 of table 5 have been developed based on Van Doren et al. 2013, Arts et al. 2012, Hapuarachchi et al 2016, Chanchitpricha and Bond 2013, Arend et al 2009, Polido, 2016). S1 to S2 have been developed based on Arts et al. 2012, Theophilou et al. 2010. Gallardo and Bond, 2011. C1 to C5 , finally, are based on contextual factors identified through literature review (table 2) and interviews.

Table 4: near here

2.2. Methodology

Data collection included document analysis (EIA reports), semi-structured interviews and site visits. Within the ULB, only three dam projects were found that had actually been subjected to EIA and where EIA reports were available. These three EIA reports were studied as part of the documentary analysis. With regards to interviews, two rounds were conducted, firstly in 2017

(October) and secondly in 2018 (May). Snowball sampling was used for identifying suitable interviewees, commencing with referrals from known contacts in the Iranian EA community and water authorities. A total of 30 interviews were conducted at the national level during the first round, focusing on exploring the EIA system and contextual factors influencing the effectiveness of the EIA system in Iran. During the second round of interviews, the focus shifted to the provincial level. The contextual factors established in the first round of interviews were explored in further detail in the 20 interviews that were carried out with local EIA experts (Table 5). This paper presents the data collected from the second round of interviews. It should be noted that it was not possible to interview the people who had been directly involved with the three EIAs. Interviewees included those from EIA consultancies who were involved in EIA activities of dams.

Table 5: near here

2.3. Case studies

ULB has been an interest to the Iranian Ministry of Energy (MoE) for many years as it contains nearly 7% of Iran's water resources (Hashemi, 2012). The MoE is responsible for Water resources planning, and management in Iran and all damming decisions are made by them and executed by provincial Water Companies. These dams are funded by the Management and Planning Organisation (MPO) (Hashemi, 2012). There are 53 operational dams in ULB. A further 9 are currently being built and 27 are in the design stages (ULRP, 2015). 24 out of 53 operational dams in the basin were exempt from obligatory EIA based on the Iranian screening threshold, which is dams with a height of above 15 meters. This means that 19 dams would require EIA. However, 11 were planned before EIA became a formal requirement in Iran. Even out of the eight that should have had EIA conducted, only three were found to have prepared EIA reports. These three are considered in this paper. Table 6 lists the three case study dams for which EIA reports were prepared.

Table 6: near here

Figure 1 shows the location of the three cases within the ULB. Kani sib dam is located just outside the ULB. However, it is specifically selected as a third case study as it is a sub project of transferring water from the Zab basin to Urmia Lake (See table 3). Transferring water from Zab river to the ULB is one of the ULRP's measures and this has become a very controversial

issue in Iran. The contract of the project was signed in 2016 and the dam is now under construction without EIA approval.

Barandoz dam is in the ULB and its EIA report was approved in 2009 with construction starting in 2010. However, it will not be allowed to operate due to the ULRP's measures which banned any new dam construction and operation in the ULB.

Zola dam, finally is the only operational dam with EIA approval in the ULB. The EIA was approved by the EIA committee in 2006 based on certain terms and conditions. However, the dam's construction had already started 5 yesr prior to EIA approval in 2001. It has been in operation since 2010.

Figure 1: near here

3. EIA effectiveness

In this section, EIA effectiveness is discussed, based on an application of the framework introduced in section 2-1. Results are categorized in three sections, as follows:

- Procedural effectiveness in ULB
- Substantive effectiveness in ULB
- Contextual factors

3.1. Procedural effectiveness

3.1.1. Scoping

All three EIA reports have similar terms of reference (TOR). This is in line with interviewees' suggestions that scoping is bypassed in Iran by using generic TOR for EIA reports. Some interviewees suggested that in Iran during scoping geographical boundaries are merely defined for the EIA study. There is no comprehensive stakeholder participation at the scoping stage, and developers are not sure about what kind of impacts and issues needed to be included in the EIA.

3.1.2. Assessment of alternatives

Interviewees suggested that EIA studies were conducted only after site selection had already been completed. In two of the three cases, this was said to have happened only after the

construction phase had already started. This may be due either to political pressure or to the bureaucratic nature of the EIA approval process, which could delay decisions. Therefore, there is no meaningful consideration of alternatives in EIA. In this context, one interviewee from a water authority stated that:

"*EIA approval is very bureaucratic and takes too much time – even up to 4 years, therefore we cannot wait for EIA committee while the MoE has an approved budget to build the dam"*.

Document analysis confirms this claim since Zola dam was built between 2001- 2010, but the EIA approval was only obtained in 2006. It is claimed that the delay of 5 years was due to bureaucratic hurdles. Kani sib dam is a component of the Zab water transfer to Urmia Lake, which is a ULRP measure. The Kani sib's EIA committee was held in 2013. However, at the same time construction had already made 10% physical progress, and no EIA approval was granted. Although interviewees claimed that two alternatives were considered, consisting of the proposed project (i.e. the preferred option) along with the zero (i.e. no action) alternative, this couldn't be confirmed by the document analysis. Barandoz dam's EIA report only focused on the final alternative. Various technical options of Kani sib dam are mentioned in the first chapter of the EIA report, but the final alternative is said to have been chosen based on the availability of construction material and economic parameters. The same weakness was observed in Zola dam's EIA report in which only the preferred alternative was considered in the EIA study.

3.1.3. Participation

EIA is unlikely to be effective without an effective engagement with stakeholders (Aung 2017). While EIA should include early public participation (Bond et al. 2004), there is no sign of public participation in the Iranian EIA process (Ahmadvand et al. 2009; Moradi 2009; Nouri and Nikoomaram 2005). There is also no evidence of public participation in the three EIA reports. This was confirmed by most interviewees. At the provincial level though, there is a public participation office of regional water companies which was established in 2010. Interviewees in West Azarbayjan Water Company said that they were pioneering in the establishment of a public participation office in Provincial Water Companies. Also, the public has been engaged in discussions on the operational programmes of some dams, involving a local Water Cooperative. In cases where indigenous communities raised objections with a dam construction in their region, the Water Company is said to have given

due consideration to their concerns. The head of the public participation office in West Azarbayjan pointed out that they aim to consider concerns of local people in water allocation seriously. Therefore, there is some evidence of public participation in Iranian water management, though this is currently not facilitated through the EIA process.

The interviewees were also asked about accessibility to EIA reports. Some believed in the transparency of the EIA process, but also said they were not allowed to provide public access to the EIA reports. Hence, EIA reports are treated as confidential documents and the public do not have access to them. This means that there is no transparency and hence effective involvement does not happen (Fischer 2005).

3.1.4. Consideration of cumulative effects

Interviewees suggested that effects from the operation of several dams along the same river are currently not addressed in any EIAs, claiming that consideration of cumulative impacts is completely absent. In this context, some mentioned that there is no legal provision for cumulative or basin impact assessments to be considered. Moreover, all EIA reports are prepared based on a generic TOR, therefore, consultancies never scope cumulative impacts into the EIA. Zola and Derik dams have been built on different branches of the same river (Zola river) and Derik dam has been constructed before Zola. However, there is no evidence of the Derik dam's effects being considered in Zola dam's EIA. This implies that Zola dam's EIA has been studied separately from the possible cumulative effect of the Derik dam. Figure 2 shows the dried-up riverbed of Zola downstream during a wet month. The picture was taken by the first author during a field visit.

Some interviewees suggested that individual EIAs cannot consider the massive scale of development happening in the basin and that ULB needs an SEA to be prepared. It is important to note that legal requirements for the assessment of policies, plans and programs is provided as a part of the 5th NDP (since 2010). The Head of the EIA bureau stated that they were aware of the need for SEA in some development areas, however, that they did not have the capacity and understanding needed to conduct it.

3.1.5. EIA Follow-up

All interviewees confirmed that follow-up is currently very limited in Iran. Based on Jha-Thakur et al. (2009b), a follow-up design needs to determine roles and responsibilities, scope

of follow-up issues and methodologies for follow-up programmes. Document analysis of the three EIA reports shows that EIA follow-up design has not been considered properly. For example, allocation of tasks, roles and responsibilities between stakeholders is not clear. EIA reports have failed to explain how monitoring should be conducted. Site visits and inspections are tools that can be used in follow-up programmes (Baker 2004; Jha-Thakur et al. 2009b; Nicolaisen and Fischer 2016).

Interviewees further confirmed that mitigation plans were not implemented. Since building a dam in a river is expected to lead to a decrease in flows downstream, causing a significant impact, one of the most important mitigation measures during the operation stage in a dam's EIA report is the management of change in downstream water quantity. Environmental flow requirement for the sake of downstream water rights has been recommended as a mitigation measure in all three reports. Interviewees were asked about the implementation of water right mitigation measures. All stated that this was not implemented by the MoE. The most well-known historical flow method is the Tennant method, also known as the Montana method, which specifies that 10% of the average flow is the lower limit for aquatic life and 30% of the average flow provides a satisfactory stream environment (Beca 2008). The Tennant method has been adopted as the most common method for environmental flow requirements in the world (Karimi et al. 2012). In order to prevent the total drying up of riverbeds, the MoE has provided a guideline based on the Tennant method for the maintenance of a constant minimum flow of 10-30% of the average flow. Interviewees stated that consultants must consider this guideline in providing Environmental Management Plans (EMPs) for dams. Representatives of Environmental and Water authorities declared during interview that to date, compliance has not been happening. A site visit confirmed this information. For example, according to Zola's EIA approval, the MoE is committed to allocate an environmental water requirement. However, the Zola river downstream is completely dry before reaching Urmia lake. This is owing to upstream dam constructions (See Figure 2). Interviewees claimed that inspections were very infrequent and were conducted at random due to a shortage of resource capacity in the DoE at national and provincial levels.

Figure 2. near here

3.2. Substantive effectiveness

3.2.1. Decision making

Seventeen participants were asked to provide their opinions on the main effect EIA had on decision-making. All interviewees claimed there were few examples where dialogue between EIA practitioners and proponents led to project modifications before the submission of the EIA report (Figure. 3). Therefore, they confirmed that EIA had a very limited influence on decision-making. Ten interviewees (59%) believed that the decisions had already been made before the EIA study, so it could hardly influence decision-making. They believed that the EIA often takes place late in the planning process and as a result, decisions are already taken when EIA starts. Therefore, EIA is mainly used in legitimizing projects. Two interviewees (12%) stated that an EIA is sometimes conducted in parallel with the engineering design stages, and the outcome of the EIA could affect the project design. However, some proponents are not open towards changes to the project's design during the EIA process and resist changes to their design. Furthermore, five interviewees (29%) claimed that impact on the project and effect on design would come from the EIA Committee rather than consultancies, because there is no clear communication between the proponent and the consultant.

Figure 3: near hear

3.3. Contextual Factors

The contextual factors affecting the EIA system in Iran are further explored in the following paragraphs with regards to legal basis, culture of decision making, political pressure, changing party politics and organizational capacity.

3.3.1. Legal basis (Clear provisions and competences to conduct EIA effectively)

"Without formal requirements and provisions, EIA is bound to be "toothless" and highly sensitive to political struggles and power games" (Fischer 2005, p. 414). 63% of interviewees confirmed that there was a lack of sufficient legal basis and inadequate penalties and that this was the main reason for EIA violations. The Iranian EIA screening list excludes considerable numbers of dams in the basin and only dams with a height above 15m need to be subjected to EIA. Moreover, ground water extraction is not in the screening threshold. Water extraction

must be given environmental consideration, though. In line with international practices, groundwater abstraction of more than 10 MCM should be subject to EIA. However, groundwater abstraction or artificial groundwater recharge schemes have not been included in the Iranian screening list. It is fair to say that currently environmental consideration of groundwater extractions has not been considered. Groundwater resources in Iran and the ULB are only controlled by private landowners of wells. Furthermore, the country is missing effective penalties for EIA violations. Along with other environmental laws, EIA legislation should be clear about what effective penalties are and should be explicit as to how enforcement should happen.

3.3.2. Culture of decision-making

EIA systems need to be rooted in existing decision-making cultures. Jha- Thakur (2006) states that an EIA system that suits e.g. a federal democratic country might not be suitable for a country with e.g. a centralized government (see also Gazzola and Fischer 2006). The existing distribution of administrative functions shows that Iran can be considered a centralized country (Dienel et al. 2017). In centralized government, the political culture of decision-making is less open and public participation is not necessarily considered positively (Chen 2013). Two interviewees confirmed that: "The Iranian dominant culture is centralized decision making which hinders the development of public participation culture not only in EIA projects but in all projects' planning systems."

3.3.3. Political pressure

Interviewees were asked about the role political pressure plays in the Iranian EIA system. All of them believed that the EIA approval process can be easily derailed by powerful lobbies. Twelve out of 20 interviewees said that political pressure greatly affects national projects more than small projects, because politicians believe that these projects are 'strategic' for the development of the country and do not need EIA. Three interviewees mentioned that in some cases, the technical staff of the EIA commission had opposed approval of the project and/or rejected it, but powerful proponents used their influence to force the approval of politically important projects through. Eight interviewees claimed that political lobbies are an important factor in EIA offices at provincial level, too. In some cases, the head of environmental offices in the provinces had struggled to stop legal violations and was hampered by political interventions. Interviewees also mentioned that political pressure had a higher impact on EIA

committees at provincial level than at the DoE's EIA committees (i.e. at national level). This was apparent especially in provinces with low levels of economic development where politicians prioritized economic development over the environment.

3.3.4. Changing party politics

Table 7 compares EIA approvals under Conservative and Moderation Governments and shows that during periods of a Conservative Government, the focus is on economic development. Some interviewees felt that the Conservative Government (2005-2012) was pragmatic and believed that EIA approval caused delays to necessary development investments. As a result, projects could easily get EIA approval and political pressure greatly affected EIA approval. However, during the following Moderation Government's tenure (2013-2017), political pressure was believed to be less strong over EIA project approvals, which became stricter during that period.

Table 7: near here

3.3.5. Organisational capacity

- Human resource and capacity building

A common weakness of the EIA system mentioned by participants was the lack of skilled staff and capacity building. Participants were asked about adequate staff at national and provincial levels in EIA administrations. Five interviewees stated that the EIA Bureau at national level has 28 staff members, of whom 25 are EIA reviewers. One staff member in the auditing section said that he oversees the EIA implementation of all projects at random due to a lack of staff availability. Interviewees stated that lack of auditing in EIA follow-up is related to a lack of human resource in the DoE offices at provincial levels. One interviewee, from West Azarbayjan's DoE office, stated that there are four experts in the EIA office at this province, which is not sufficient to review all EIA reports and to conduct auditing. He mentioned that the amount of funds allocated to the DoE and the EIA authority has a direct effect on the number of staff that can be recruited at national and provincial levels. A similar observation was made in the case of India, where understaffing did not allow EIA to be implemented effectively (See Jha-Thakur 2011).

Ahmadvand et al. (2009) believed that some staff members in the EIA Bureau were not professionally qualified. All interviewees confirmed that the EIA Bureau does not have

sufficiently qualified personnel, and twelve interviewees said that EIA staff needed training. Three interviewees noted that some reviewers were not educated in environmental issues. Some interviewees stated that experts in the provinces had much weaker EIA knowledge. Five interviewees also believed that experts in the EIA Bureau, consultancies and proponents should be trained.

- **Existence of general and/or specific guidelines**

The DoE and UNDP signed up to a programme to establish EIA guidelines for Iran, and these guidelines were published in 2001(Khosravi and Jha-Thakur 2018). Interviewees were asked about the guidelines and all agreed that existing guidelines were too general and largely ineffective. It is the EIA Bureau's responsibility to update them (Ahmadvand et al. 2009), which has not happened to date. The head of the EIA Bureau stated that the DoE is currently preparing an update for context specific guidelines and has associated contracts with consultancies for 4 types of projects, including dams, landfills, power plants and oil industries.

- **Openness of EIA actors towards environmental values**

Proponents are also EIA actors and should have an open attitude towards changes to the project's design during the EIA process. When interviewees were asked whether EIA affected project design, some argued that proponents often do not believe in EIA and consequently accept few design changes. The head of the EIA Bureau said that not only proponents, but all levels of Iranian decision-making did not believe in EIA and this explained why they resisted it.

4. Discussion

There are 53 operational dams in the ULB and 24 of these were exempt from obligatory EIA. Based on the Iranian screening list, only dams with a height above 15m need to be subjected to EIA. Nineteen dams should have had EIA prepared. With regards to these requirements, an initial question to be asked is whether dams with a height less than 15m do not have any significant environmental impacts. Furthermore, the cumulative impacts of smaller dams may have relatively higher impact than a single large dam (See Erlewein 2013). Aso, decisions for 11 out of 19 dams were taken before the emergence of EIA in Iran. According to EIA Bureau data, out of all the dams only three had prepared EIA reports out of which one will not be allowed to operate due to the ULRP measures. Another one has not been granted approval and yet has commenced construction while only one actually has an EIA approval and is in its

operation phase. The existence of only three EIA reports in the basin and only one project with an approval and in the operational phase is an indication of the challenges EIA is facing in the country. Considering the environmental sensitivity of the ULB, it is evident that EIA is currently not effective in providing adequate consideration of environmental effects for dams, mainly because it is not done.

Apart from dams, there is also lack of environmental assessment for groundwater extraction. However, groundwater abstraction has been included in screening thresholds in many other countries. Based on the EU EIA Directive, for example, groundwater abstraction of more than 10 MCM is subject to EIA. Nevertheless, groundwater abstraction or artificial groundwater recharge schemes have not been included in the Iranian screening list and it is fair to say that environmental consideration of groundwater extractions has been ignored within the Iranian water management context. In this context, Madani (2014) states that the only limiting factors for groundwater withdrawal are well depth and pumping capacity. Once the groundwater table drops, farmers dig deeper and install larger pumps (Foltz 2002).

Lack of environmental consideration is not only limited to the project level (dams and wells), since environmental aspects of the ULRP, a 10-year plan for restoring the basin, have not been considered. Despite the existence of legal requirements for the assessment of policies, plans and programs in the 5th NDP (Since 2010), no SEA study has been conducted for the ULRP. This has also resulted in withdrawing approval for an EIA that was previously granted and for halting the operation of the Barandoz dam. A timely SEA study could have saved the cost and effort that was already put in place for this particular dam. Based on interviews, the lack of SEA implementation is perhaps owing to the lack of skilled resource and capacity needed for conducting SEA studies in Iran. Interestingly, the third case study, Kani sib dam, is one of the ULRP measures. As mentioned in the methodology section, this dam is specifically selected as a third case study because it is a sub project of transferring water from the Zab basin to Urmia Lake. The contract of the project was signed in 2016 and the dam is now under construction without EIA approval. Based on the opinion of the interviewees, Kin sib is an example of a dam construction which has commenced before EIA has been approved due to political pressure.

Our findings indicate that the Iranian EIA system is not procedurally effective. There is no evidence of public participation in the EIA reports, which was also endorsed by most interviewees. Chen (2013) believes that the development of public participation in an EIA

system is frequently influenced by a country's political culture of decision making. Thus, it is valued less in centralized countries like Iran. Interviews and document analysis also confirm that cumulative effects from the operation of several dams along the same river are not addressed in EIA reports. Moreover, it was stated that cumulative impacts were not considered in the Iranian EIA process. Some participants suggested that SEA could play an important role to close the gap regarding the assessment of cumulative impacts in the basin which are resulting from extensive dam building. It is fair to say that SEA has the potential to address the urgent problem of cumulative impacts (Dixon and Thérivel 2011; Harriman and Noble 2008). Whilst SEA is not a practical tool for reviewing specific cumulative impacts in detail, it does provide an entry point for cumulative impact assessments (CIA) as an integral part of basin plans (Erlewein 2013). It should be noted, however, that currently EIA itself has not really gained any ground in Iran. Therefore, foundations for an EA system will have to be laid before merely suggesting that SEA should be introduced.

There is a somewhat blurred understanding of what is meant by scoping among interviewees, as some interviewees perceived it merely as a stage at which geographical boundaries are defined for the EIA. The EIA reports show that scoping is limited to defining geographical boundaries. Thus, Interviews and the EIA reports claim that the scoping stage has been neglected completely in the EIA process in Iran.

Interviews and document analysis confirm that the EIA reports are treated as confidential documents and the public do not have access to them. Therefore, the EIA process in Iran lacks transparency. A transparent and clear process is the basis for effective participation and this participation will clarify the different opinions and substantially influence the quality of the EIA output (Fischer, 2005). Public participation brings transparency in the EIA system (Kumar Dara et al., 2017). Thus, by improving public participation in the process, the transparency of the system can be improved. This is also likely to enhance the acceptability of the projects (Marara et al. 2011).

Our findings indicate that the Iranian EIA system is not substantively effective. An EIA system can be considered effective when it integrates impact assessment into a course of action (Rozema and Bond 2015). However, all participants confirmed that EIA in Iran has had a very limited influence on decision-making due to non-application, and is applied the late start of EIA, lack of coordination, and political pressure. Communication between the proponent and the consultant was not clear and hence a holistic understanding of the decision-making process

is lacking. Lack of coordination is an important factor which hinders and delays effective and sustainable decision- making (Wayakone and Makoto 2012). Lack of coordination has also been seen amongst different ministries. This is demonstrated by interviewees revealing that the MoE commences dam construction without EIA approval while it has an approved budget to build the dam. Therefore, good coordination among proponents and financial institutions providing finance can also help in ensuring that no project likely to have adverse environmental impacts could be launched before securing EIA approval.

Our evaluation shows that contextual factors influence the effectiveness of the Iranian EIA system. In a survey about EIA effectiveness in the Netherlands and the UK, participants were asked about the most important factors for effective EIA (Arts et al. 2012). In both countries, most of the respondents considered complying with legal requirements as the most important reason for environmental behavior of proponents and authorities, meaning EIAs are conducted because EIA is mandatory, not because actors want to achieve more environmentally sustainable outcomes with the help of EIA (Arts et al. 2012). Furthermore, for South Africa (Craigie et al. 2009) found that only 15% of those involved in EIA act on the respective law because they believe in it, but 70% act on it for fear of litigation. As discussed, Iran lacks a strong legal foundation to provide back up for taking stern action against violators of EIA requirements and EIA implementation. Therefore, new legislation for EIA in Iran would be a key condition for effective EIA. Furthermore, clarity is required with regards to what effective penalties are and how they should be enforced.

Another important contextual factor affecting EIA is the capacity of the EIA authority (Kolhoff et al. 2009). Fischer (2005) suggested that an EIA authority needs to be given some autonomy and power to avoid situations in which other organizations can put too much pressure on them. Another topic which emerged from interviews was the issue of weak follow-up. Lack of an adequate legal basis, workload capacity and inadequate staff numbers are also important contextual factors that were mentioned by most DoE staff at national and provincial levels. The development of the capacities of environmental authorities do not rank high on the political agenda of many countries (UNEP 2004; Kolhoff et al. 2009). Iranian politicians generally consider autonomous environmental authorities as barriers to economic growth. This implies that there is no political will to support EIA. As a result, the EIA approval process is easily derailed by powerful lobbies in Iran. Interviews and document analysis also confirm that EIA reports are treated as tools to gain approval but once the approval is granted their value

diminishes. However, as is evident from the case studies, the existing political pressure is so high that water authorities are often not even required to prepare EIA reports.

It is therefore clear that in order to improve environmental consideration in water management, there is an urgent need to strengthen EIAs at project level. In addition to this, the introduction of SEA is necessary which can take account of the wider implications of extensive dam-building, thus overcoming project reductionism (Agrawal et al. 2010; Grumbine and Pandit 2013; Erlewein 2013). Table 8 summarizes the EA effectiveness in ULB. The method for judging criterion performance was based on Wood (2003), such that the response to the question "has the criterion been met?" is either "yes", "no", "partially" (Theophilou et al. 2010).

Table 8: near here

5. Conclusions

Extensive dam building activities and ground water extraction is without doubt a key anthropogenic factor shaping the unfolding environmental disaster in the ULB. This is just one evident symptom of the malfunctioning of the water management system in Iran (Madani 2014). Hamoun, Gavkhouni, Parishan and Shadegan (Davtalab et al. 2014; Kaffashi et al. 2011; Sima and Tajrishy 2006; Zamani-Ahmadmahmoodi et al. 2010) are other lakes and wetlands that have lost their environmental health due to the anthropogenic effects of development projects.

Results of the research underlying this paper suggest that environmental assessment in Iranian water management is currently restricted to the project level and that the current EIA system is neither procedurally nor substantively effective, as it is not able to address and mitigate the larger effect of extensive dam-building, first and foremost because it is usually not applied when it should be. Furthermore, the threshold for screening excludes considerable numbers of dams in the basin. Also, ground water use is excluded in the Iranian screening list. There are also deficiencies in scoping, public participation, alternative consideration, and EIA follow-up. Lack of cumulative impact assessment in the Iranian EIA process indicates an urgent need for SEA which goes beyond the level of individual projects. In this context, SEA can play a major role with regards to cumulative and basin effects that are currently not addressed in EIA studies. SEA could contribute to avoiding such disasters in ULB and other basins, having the opportunity to proactively consider the cumulative effects of multiple projects and large-scale

dam policies, as well as the synergistic effects of developments beyond damming. EA (EIA and SEA) legislation needs to become stronger and along with more clearly defined roles and responsibilities of stakeholders. Addressing the various weaknesses and missing elements that have been identified in this work would go a long way in enhancing EA effectiveness in Iran.

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Table 1. Different categories of EA effectiveness

Focus	Categories	Authors
Establishing concepts	Procedural, substantive and transactive	Sadler 1996 Sadler 2004
	Procedural, substantive, transactive and normative	Baker & McLelland 2003 Chanchitpricha& Bond 2013 Arts et al. 2012
	Procedural, substantive, transactive and normative (including aspects of pluralism and knowledge/learning)	Bond et al. 2012 Bond et al. 2013 Bond et al. 2017
	Procedural, substantive	Jha-Thakur and Fischer, 2016
Empirical analysis	Procedural, substantive	Fischer, 2002 Hapuarachchi et al. 2016
	Substantive and transactive	Theophilou et al. 2010
	Procedural, substantive and transactive	Baker & McLelland 2003
	Procedural, substantive, transactive and normative	Gallardo & Bond 2011 Chanchitpricha et al. 2011
	Procedural, substantive, transactive and normative (including aspects of pluralism and learning)	Therivel, 2013 Morrison-Saunder and Pope 2013 Retief 2013

Adapted the framework from Bond et al., (2013)

Table 2. Frameworks for contextual EA factors

Scholar	Context factors frameworks
Fischer (2005)	- Formal requirements and provisions; - Clear goals; - Appropriate funding, time and support for EA; - Willingness to cooperate; - Clear assessment boundaries; - Acknowledgement of uncertainties.
Runhaar and Driessen (2007)	- Degree of consensus about values regarding the policy issue; - Certainty about the knowledge base; - Characteristics of the decision-making process (openness of decision-makers).
Arts et al. (2012)	- Characteristics of EA results; - Course of EA-process; - Characteristics of EA actors; - Characteristics of the decision-making context.
Van Doren et al. (2013)	- Certainty about the knowledge base; - Agreement on norms and values; - Characteristics of the decision-making process (Openness of decision-makers towards environmental values).

Momtaz and Kabir (2013)	- Political will; - Bureaucratic culture; - Environmental awareness among the proponents and local community; - Favourable socioeconomic conditions.
Hapuarachchi et al. (2016)	- Consultation and public participation; - Policy context; - Transparency and Accountability; - Political will; - Coordination; - Funding conditions.

Table 3. Water Supply Potential for Urmia Lake during ULRP

Water source	**Description**		**Annual volume of water transfer to lake (MCM[1])**
Current volume of water transfer to the Lake from Rivers	Net water inflow volume to the lake's water body		1500
Water resources outside basin	Water transfer project from Zab basin		600
	Water transfer project from Lavin river (Silveh dam)		5th year: 190 3rd year: 90
Water resources outside basin	Basin seepage		300
Reducing the water consumption in agricultural sector	Savings in agricultural water use (40%)	From surface water resources	970
		From ground water resources	370
	Releasing water storage of dams		Year One: 150 Year Two: 200 Year Three: 250
Reducing the water loss in the lake's buffer zone	Water transfer to lake's body of water		250

(ULRP, 2015)

[1] Million Cubic Meter (MCM)

Table 4. List of criteria used in examining the EIA effectiveness in ULB

EIA Effectiveness dimension	Criterion	question form of criterion	Source of data		
			interview	Document analysis	Site visit
Procedural effectiveness criteria	**P1. Scoping**	• Does EIA consider early participation of stakeholders in the scoping?	*	*	
	P2. Cumulative effects	• Does EIA consider cumulative impacts of other dams in the basin?	*	*	
	P3. Alternatives	• Does EIA consider Alternatives of a dam?	*	*	
	P4. Participation	• Are Stakeholders participated with during the dam's EIA process?	*	*	
	P5. EIA Follow- up implementation	• Are the EIA's conditions implemented? • Is monitoring implemented in water management?	*	*	*
Substantive effectiveness criteria	**S1. Decision making**	• Does EIA integrate with decision-making and affect project design?	*		
	S2. Communication	• Is there regular communication between EIA team and design team?	*		
Contextual factors	**C1. Legal basis**	• Is there a clear legal basis for conducting EIA?	*	*	
	C2. Culture of decision-making	• Does having centralised governments affect effectiveness of EIA?	*		
	C3. Political pressure	• Does political will have an effect in EIA approval?	*		
	C4. Human resource, and capacity building	• Are there adequate skilled staff for the EIA administration? • Are there updated EIA guidelines in Iran? • Do EIA actors have open attitude towards change?	*		
	C5. Changing party politics	• Does changing government affect the EIA system?	*		

Table 5. Participants in the second round of interviews

Provinces	Organisation	Number
West- Azarbayjan Province	Department of Environment (DoE) in West- Azarbayjan	3
	West- Azarbayjan Water Company	4
East- Azarbayjan Province	DoE in East- Azarbayjan	3
	East- Azarbayjan Water Company	4
-	EIA consultants	6
Total		20

Table 6. The EIA reports used in EIA effectiveness examination

Project	Adjustable Water volume (MCM)	Status
Zola dam	132	In operation
Barandooz dam	239	Under construction
Kani sib dam	703	Under construction

Table 7. Number of EIAs in two different governments in Iran

	2005- 2012 (Conservative Government)	2013-2017 (Moderation Government)
Number of EIA Committees	877	76
Number of EIAs reviewed by Committees	1343	257
Number of approved projects	512	66
Number of rejected projects	51	98
Number of projects need revision	314	93

Source: Performance report of the Deputy for Human Environment (2013- 2017); Rahmati 2014

Table 8. Effectiveness of the EIA system in ULB

Criterion	question form of criterion	performance
P1. Scoping	• Does EIA consider early participation of stakeholders in the scoping?	×
P2. Cumulative effects	• Does EIA consider cumulative impacts of other dams in the basin?	×
P3. Alternatives	• Does EIA consider Alternatives of a dam?	×
P4. participation	• Are Stakeholders participated during dam's EIA process?	*
P5. Mitigation measures	• Are the EIA's conditions implemented? • Does the EIA consider the Environmental water right of river?	×
P6. EIA Follow-up implementation	• Is EIA Follow-up implemented in water management?	×
S1: Early start	• Does EIA initiate at first stages of design to aid decision making?	×
S2. Decision making	• Does EIA integrate with decision-making and affect project design?	×
S3. Communication	• Is there regular communication between EIA team and design team?	×
C1: Legal basis	• Is there a clear legal for conducting EA at strategic and project levels	*

C2. Human resource, and capacity building	• Is there adequate skilled staff for the EIA administration? • Openness of EIA actors towards environmental values	*
C3: Culture of decision-making	• Does having centralised governments affect effectiveness of EIA?	✓
C4: Political pressure	• Does the political pressure have affect in EIA approval?	✓
C5: Changing government	• Does changing government affect the EIA system?	✓

Meeting criterion:

✓ Yes

* partially

× No