Netherlands Commission for
Environmental Assessment
Dutch Sustainability Unit

Better Decision-Making about Large Dams with a View to Sustainable Development

Second Edition

1 June 2017
Ref: 7199

Advisory Report by the Dutch Sustainability Unit

Subject	**Better Decision-Making about Large Dams with a View to Sustainable Development**
Edition	**2nd** *Note: after publication of the first version, the NCEA decided that some parts of the advice were unnecessarily suggestive and needed rewording without changing the nature of the advice. To that end a second edition of the advice has been published. Users are therefore requested to refer the second edition, as it is clearer.*
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Reference	7199

The Dutch Sustainability Unit is hosted by the Netherlands Commission for Environmental Assessment at the request of the Ministry of Foreign Affairs. The views expressed in this publication are those of the DSU and do not necessarily reflect the views and policies of the Netherlands Government.

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1. Summary

The purpose of this advice is to provide updated insights to enable discussion on the options and instruments available for a donor, such as DGIS, to contribute to decision-making on large dams that will be most beneficial for sustainable development. To that end, the DSU has carried out a study of recent publications, and undertaken expert consultations, on the sustainability including SDGs, energy transition, cost-effectiveness and future perspectives of large dams. Experts were selected from different backgrounds (financial institutions, research institutes, consultants involved in decision-making on dams) to acquire an updated view of current thinking about large dams and how these score against alternative options. Based on the results of that study, the present advice has been developed. It includes some policy suggestions that DGIS could further develop.

Many large dams have been built in the past to the satisfaction of their stakeholders. The production of energy, storage of water and its use for e.g. irrigation purposes have been beneficial in many parts of the world. However, recent experiences including the fast development of alternative renewable energy resources, research outcomes and prognoses of the impact of climate change indicate that adverse impacts of large dams in certain cases can be more significant than foreseen. For example, human rights are not always sufficiently observed, socio-economic consequences are sometimes underestimated, some reservoirs emit significant amounts of greenhouse gases, water availability may diminish due to climate change and in some cases large dams lead to stranded assets. In addition, the transition towards other forms of renewable energy is getting more realistic given the decline of production costs and lower socioeconomic and environmental impacts. These new insights demand a more careful assessment of decisions on investment in large dams.

This report doesn't judge on the feasibility and contribution of large dams to sustainable development. That judgement remains the prerogative of the political domain. This advice is about the process that leads to decisions whether or not to invest in the construction of large dams and on which types of information and assessments these decisions should be based. Better-designed decision-making and assessment processes have a better chance of leading to decisions that contribute more to sustainable development. As DGIS is not the only donor involved in such processes, this advice may also be of interest to others.

The first observation is that practice shows that prevention and mitigation of negative effects of large dams often falls short. In existing environmental assessment and safeguards systems potentially more sustainable options than large dams such as solar, geothermal and wind energy are often not transparently considered. This results in unnecessary risks, included those of resettlement and human rights, negative effects on ecosystem services, operational and economic performance risks, including time overruns and ultimately stranded assets. Underestimating risk in some cases appears to be an incentive not to look for alternatives, which undermines sustainable development.

The second observation is that drivers for negative effects are mostly related to the wider governance context, particularly:

- neglect of strategic and system-based studies;
- favouring large dams above potentially more sustainable options without sound and transparent justification;
- national public governance incapable of correcting this situation due to late or insufficient involvement in the development process.

This advice, then, looks at the available options to improve the development process where large dams are envisaged. First, large dam proposals submitted for approval could avoid bias in their benefit-cost assessments by including realistic horizons and all costs associated with risks, including corruption. This reduces the risk of creating a stranded asset. The same is true for paying fair attention to alternatives earlier in the preparation planning process. To that end, the advice lists two possible main donor strategies for improvement.
First, to consider putting more emphasis on a fair comparison of up-to-date alternatives before choosing large dam options. Second, to consider stimulating a transformative change towards a more system-based approach. Such approach takes a different point departure. It does not start from a large dam proposal, following which alternatives are investigated. But rather starts from the societal needs for energy, food and water. Then looks for the best sustainable ways of fulfilling these needs, in which large dams are one of the options.

In order to operationalise such strategies, donors may use a decision-matrix. A possible decision-matrix is developed in this advice (see Annex 1). It has three main components. First, and upfront, an assessment of the governance context including track record on respect of human rights. Second, an assessment of the capacities for transformative change within public institutions. Based on these two assessments a donor may decide that the governance context is such that financing a large dam proposal could lead to unacceptable risks. An alternative to consider would then include activities to improve governance or to support selected institutions on improved practices for strategic planning. Where the donor considers the governance context to be acceptable, the third component of the decision-matrix is to verify if good practices have been applied in the assessment and planning of large dams.

In short, donors may use this decision-matrix, or a similar one, to develop their detailed guidance to support system-based environmental and social assessments, that look at alternative options, multi-functionality of these options (energy, water, food security) and assessments of institutional requirements at different levels and sectors, as well as cross-boundary effects.

2. Introduction

Context and purpose

DGIS, the Directorate-General International Cooperation of the Dutch Ministry of Foreign Affairs, is increasingly being asked to participate in the financing of large dams (through financial institutions). In many cases, participation will concern dam rehabilitation, but the expected number of new large dams is also substantial.

Dams are often multifunctional: food security, water, energy supply. So, dams could be expected to contribute to DGIS' general policy objectives, which are aligned with the Sustainable Development Goals (SDGs). In particular goals related to water supply, food security and affordable energy. However, there are strong indications that this is not the case for all large dams. Despite the application of environmental and social safeguards, large dams may have negative effects on SDGs. This is true for each pillar of sustainable development: economic, environment (which includes biodiversity conservation) and social (which includes protection of human rights).

This raises the discussion about whether DGIS development funds will be used in a cost-effective way when DGIS participates in the financing of large dams. It also raises questions about the effectiveness of established Environmental and Social Safeguard systems and newer assessment frameworks such as the Hydropower Sustainability Assessment Protocol (HSAP). In practice, complications in the planning and implementation process of dams are not uncommon, either in their design, approval and/or implementation. Likewise, results may not meet with ex-ante expectations or forecasts. Although awareness of this situation is increasing among donors and financial institutions, and new approaches are being developed, it is not yet fully clear what the underlying causes are for problems during planning and assessment and what the best options for improvement are.

The purpose of this advice is to provide updated insights to enable discussion on the options and instruments available for a donor, such as DGIS, to contribute to more sustainable decision-making on large dams. This advice is aimed at discussion within DGIS and possibly within the wider donor community as well. To that end, the DSU has carried out a study of recent publications and undertaken expert consultations on the sustainability, cost-effectiveness and future perspectives of large dams. Experts were selected from different backgrounds (financial institutions, research institutes, consultants involved in decision-making on dams) to acquire an updated view of current thinking about large dams and possibly more sustainable alternatives. Based on the results of that study, this advice has been developed.

Questions for discussion

The leading question for this advice is: what are the options and instruments for donors such as DGIS to come to a response to proposals of large dams, which will most effectively contribute to sustainable development (SDGs)? Sub questions are as follows:

1. What are the risks of large dams?
2. What are the drivers of these risks?
3. How to develop sustainable integrated energy, water and food solutions?
4. What can donors do to support this development?

Box 1: Governance and good governance in planning and assessment processes

In making decisions (e.g. in design, approval or adjustment of plans), public and private actors make use of assessments to know the expected economic, social and environmental impacts of their choices. The assessment results are aimed at informing the planning process. Assessments are particularly important for large construction projects as construction results are irreversible. In addition, once the infrastructure has been constructed (ex-post) continued monitoring can be applied to determine the realised impacts and make corrections where needed. The way in which influential actors in such processes behave is called governance. The governance of these assessment and planning processes determines their outcomes. For that reason, countries have procedures that regulate the behaviour of actors in planning and assessment processes. Having such procedures and applying them can be seen as 'good' governance. It is, for example, widely accepted that those leading the assessment and planning process should assure that local and affected communities participate in an adequate way, and that key decision makers assure transparency and accountability/justification of their decisions. In practice, such requirements are not always met[1]. For example, some decisions are made without justification or with poorly developed evidence or arguments. Or, despite existing standards for human rights and consultation processes, local communities are sometimes excluded or insufficiently included in the process. Also, the capacities or procedures for transparency and accountability may not be in place.

Three phases in the assessment and decision-making process lead to financing of large dams:
1. *Strategic planning:* based on an analysis of the need for additional energy/water/food supply, system-based studies are done on a mix of options. Large dams are one of those options, based on assessments of the social and environmental consequences and the governance context.
2. *Dam pre-feasibility:* once a large dam has been identified as a possible option, strategic studies are initiated for further exploration, including siting studies.
3. *Dam feasibility and design:* after selection of the preferred dam configuration, more detailed studies are done for the chosen option, including Environmental Impact Assessment (or Environmental and Social Impact Assessment, as is the preferred terminology of many banks).

These phases show similarity with the phases of the HSAP protocol. However, there are also significant differences, especially in the first two phases. HSAP phase 1 (called early stage) already takes the large dam as a starting point and then looks back (ex-post justification). At that stage there is considerable risk that the dam will not be abandoned even if the need cannot be strongly demonstrated. In this approach, an ex-ante justification may be applied. Further details on these phases with an overview of good practices for each phase are given in Annex 2.

[1] See for instance:
1. https://www.internationalrivers.org/sites/default/files/attached-files/wcdbriefingkit_0.pdf
2. http://carbonmarketwatch.org/fact-sheet-santa-rita-cdm-hydro-dam-in-guatemala/
3. https://cgspace.cgiar.org/bitstream/handle/10568/33644/10.5%20Improved%20decision%20making.pdf?sequence=1

3. What are the risks of large dams?

Large dams are commonly considered to meet high energy needs in a green and sustainable manner. However, large dams are also known to have serious social risk (in particular human rights) and environmental risk (in particular biodiversity), which is why environmental and social safeguards systems are in use. Much attention has been given to the development of assessment and planning processes to identify and mitigate these risks. However, despite these processes, risks are sometimes not effectively identified, prevented, mitigated or compensated. Also, and increasingly so, there is discussion as to whether effects may be more effectively prevented by adopting options more sustainable than large dams. Options that may score better, not only from a social and environmental, but also from an economic point of view, i.e. national economy and investor's returns. While specific large dam projects can overall significantly contribute to sustainable development goals, they may also still have negative effect on some of these goals, at least for certain social groups.[2]

Both social and environmental effects are often reported as under-estimated[3] while economic and financial benefits are over-estimated. The development and implementation of social and environmental prevention, mitigation and compensation plans may often be weak in practice, for example when it turns out to be costlier than expected. The main social and environmental concerns and risks of large dams reported are:

- violations of human rights, especially indigenous rights [4];
- ability to re-establish sustainable livelihoods following resettlement [5];

[2] For instance when local communities lose their lands without adequate free prior informed consent procedures.

[3] See for instance: https://www.researchgate.net/publication/281464392_The_People_and_their_River_the_World_Bank_and_its_Dam_Revisiting_the_Xe_Bang_Fai_River_in_Laos and http://reliefweb.int/report/bangladesh/dams-accused-role-flooding-research-paper-dams-and-floods

[4] See https://www.oneworld.nl/water/bron-van-conflict/ontwikkelingsbank-fmo-neemt-inwoners-panama-niet-serieus and http://www.hydroworld.com/articles/2016/03/financiers-suspend-activity-in-honduras-for-22-mw-agua-zarca-small-hydropower-project.html

[5] World Commission on Dams (2000): "dams have negatively affected many people and societies. This is clear throughout the WCD Knowledge Base, most poignantly through many of the presentations made by dam-affected peoples in the WCD Regional Consultations and the nongovernmental organization (NGO) hearings in Europe and South Africa. Globally, the overall magnitude, extent and complexity of these adverse social impacts for the displaced and for those dependent on the riverine ecosystem – both upstream and downstream from a dam – are of such significance as to merit detailed consideration in any assessment of the rationale for dam construction. Further, it is apparent that these impacts are – even today – often not acknowledged or considered in the planning process and may remain unrecognized during project operations. Where measures are put in place to mitigate impacts on affected people they typically fail to address adequately the problems caused by the decision to build a large dam." International rivers give various examples, see https://www.internationalrivers.org/resources/when-the-rivers-run-dry-1988. Joy News' Joseph Opoku Gakpo gives an example related to the Akasombo Dam in Ghana in a video in which he visits Devime, a former fishing community in the Central Tongu District of the Volta Region and reports that the Akosombo dam has cost the jobs of locals in the community https://www.google.nl/url?sa=t&rct=j&q=&esrc=s&source=web&cd=4&cad=rja&uact=8&ved=0ahUKEwiZnLGm1fvRAhXFOBoKHQFABsgQFgg1MAM&url=http%3A%2F%2Fwww.myjoyonline.com%2Fnews%2F2016%2FMarch-22nd%2Fvideo-world-water-day-the-downside-of-akosombo-dam.php&usg=AFQjCNFv2j2RXpAoJSFmSfxNUWiDEsfw6A

- environmental risks for ecosystem values and impact on biodiversity and fisheries in the affected river basin [6];
- climate change affecting the hydrology (reduced flows, dry periods, sedimentation risks) and thus potential to meet expected water, energy and food supply objectives (e.g. Nangbeto dam in Togo; Zemo Samgori dam in Georgia);
- economic and financial risks, including the risks of corruption[7];
- the high costs of power transmission to, often distant, urban demand areas[8];
- emission of CO2 from reservoirs[9].

In addition to the complexities of social and environmental risks of large dams, many of these dams are located in large river basins with different countries involved. This leads to additional risks related to cross-boundary effects and potential conflicts . A recent study concludes that Sub-Sahara Africa cross-border cooperation often suffers from political instability and even civil disorder, creating further constraints for achieving water access agreements across national boundaries[10].

Risk underestimations are likely to reduce the incentives to look for other options to meet demand for energy and water. Development banks classify large dams among the riskiest infrastructure asset classes, as they are characterised by substantial cost and time overruns, and present substantial safety risks. A recent study concludes that 'the larger the dam, the longer the estimated implementation schedule and the higher the relative cost overruns'[11]. While large dams may be a good option to meet a developing countries' urgent societal demands for water, energy or food supply, a large dam may easily take up to 15 years to meet these demands[12].

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[6] WCD (2000): "a recent estimate that dams, inter basin transfers, and water withdrawals for irrigation have fragmented 60% of the world's rivers." "In temperate regions of North and South America, rivers have experienced massive hydrologic alterations over the past several decades. Research documented how these alterations have resulted in severe biotic impoverishment, ranging from reduced population abundance and biodiversity to range fragmentation and increases in exotic and lake-adapted taxa" Regional Effects of Hydrologic Alterations on Riverine Macrobiota in the New World: Tropical-Temperate Comparisons, 2000.

[7] Ansar, Atif, Bent Flyvbjerg, Alexander Budzier, and Daniel Lunn. In: Energy Policy, March 2014. Should we build more large dams? The actual costs of hydropower megaproject development. Energy Policy. Time and cost overruns can be predicted by the size of the dam but the economic context also matters (using an indicator of income), with risks significantly increasing in developing countries.

[8] E.g.: Embassy of the Kingdom of The Netherlands in Uganda, November 2015: Energy Country Report: Uganda

[9] The National Institute for Space Research (INPE) showed that the world's large dams emit 104 million metric tons of methane annually from reservoir surfaces, turbines, spillways and rivers "Methane Emissions from Large Dams as Renewable Energy Resources: A Developing Nation Perspective," Mitigation and Adaptation Strategies for Global Change, published on-line March 2007. http://tinyurl.com/2bzawj In a recent study advises careful siting of new reservoirs, and revising management of existing ones may help balance the positive ecosystem services that reservoirs provide against the GHG emission costs. Greenhouse Gas Emissions from Reservoir Water Surfaces: A New Global Synthesis, Bridget R. Deemer John A. Harrison Siyue Li Jake J. Beaulieu Tonya DelSontro Nathan Barros José F. Bezerra-Neto Stephen M. Powers Marco A. dos Santos J. Arie Vonk.

[10] Barasa et al. (2016). A cost optimal resolution for Sub-Saharan Africa powered by 100% renewables for year 2030. Togo and Benin have jointly applied EIA to the Adjarala dam (see http://www.eia.nl/en/our-work/advisory-reports/099-i), but this is an exception rather than the rule.

[11] Ansar et al., (in prep). Ibid.

[12] A recent example: the Kandadji Dam in Niger originally due to fill in 2015 has now been planned for 2022.

4. What are the drivers of these risks?

Underestimating the weakness of the wider governance context

The risks of large dams are intricately related to the governance context in which they are being planned and constructed. What makes large dam projects so problematic is not so much related to any individual impact or risk (such as resettlement), but to the fact that these impacts and risks need to be managed in a certain governance context. For example, a weak regulatory framework may lead to insufficient enforcement and financing of mitigating measures.

There may be a need to deal with governance systems at different levels, since dams often serve local, national as well as international (regional) and basin-wide interests. Local government is often bypassed by central construction agencies, yet, they will have to deal with local impacts in the medium and long term. In these contexts, large dams may reproduce and deepen existing inequalities between rich and poor, urban and rural, and informal small scale entrepreneurs or producers and large-scale industries. Many large dams are located in large river basins with different countries involved. While there are examples of large basins where dam projects are negotiated through transboundary agencies, such as in the Niger Basin and Mekong Basin, the risks related to cross-boundary potential conflicts are also real.

Neglecting strategic planning and system-based studies

In different ways dams are part of larger systems. In the first place, dams potentially have multiple functions, contributing to access to energy, food and water (the so-called 'nexus' view). Dams can also perform a climate change mitigating function. In other words, multiple sectors are involved. Secondly, large dams are positioned in a water basin system, where cumulative effects of different interventions are important to take into account. Thirdly, there may be alternative options to serve the societal needs in terms of energy, water and food production, other than large dams.

Most existing studies and assessments of large dam projects do not place the findings in a wider, integral perspective of energy, water and food systems. Decision-makers may command strategic studies such as Strategic Environmental and/or Social Assessments, but usually these studies do not take an integral systems perspective throughout a strategic planning phase.

Box 2: The sequence of improvements in decision-making, but where to start?

All experts consulted for this study seem to share the view that the commonly seen assessment and decision-making process for large dams is insufficient. However, they do not present a clear solution. Typically, their reasoning is as follows:

- We have a safeguards system, but it is not enough → we need to define the 'right projects' and not only 'doing them right'.
- We undertake screening at early stages using multiple criteria, but it is not enough → we need to address cumulative effects.
- We undertake river-basin wide assessments using multiple criteria, but it is not enough → we need to look at alternative strategies to meet societal goals and multiple functions.
- We undertake a systems approach with multiple options, but it is not enough → we need to address the political level where choices may already have been made.
- We add a capacity building component to influence responsible agencies, but it is not enough → big dam projects are still not sustainable.

In summary, if the objective is to find solutions that are in the public interest, decision-making about large dams is a demanding and complex issue, requiring a multi-sectoral strategic vision and sufficient implementation capacity, awareness of societal needs, alternative options and best practices, quantitative data and models, and stakeholder involvement.

Lack of sound justification

For different reasons a bias in favour of large dams may exist among decision-makers:

- Decision-makers may be unwilling to have assessments of alternative options to large dams made in a transparent way. The global energy transition and SDGs support potentially more sustainable options than large dams such as solar, geothermal and wind energy. Without considering these alternatives in assessments, it is likely that large dams will form the *de facto* outcomes of many planning processes.
- Large dams have always been popular among national politicians as well as construction companies and financing institutions, as they are seen as major drivers of development. This is accelerated by the fact that large dam projects are currently able to access finance through climate mitigation subsidies, by positioning large dams as being green and sustainable as compared to oil, gas and coal fired thermal power plants, in view of the low carbon emissions[13]. There are several examples of 'old' large dam projects that have been revitalized with the help of climate funds[14] [15]. A choice in favour of large dams is enhanced by mutual interest between governments, industries, engineering consultants and financial institutions to acquire access to finance.

[13] There is increasing CDM financing for what is considered "small dams" and many countries like India, China, Mexico and Brazil have greatly "relaxed" legislative and regulatory checks for small dams (Opermann, 2014).

[14] For instance, at present ECOWAS (economic union of west African states) has planned the development of 7,000 MW hydropower energy and only 800 MW renewable energy in West Africa.

[15] see http://pubs.iied.org/pdfs/17580IIED.pdf

- Multi-purpose dams are complex and tend not to perform as well as single-function dams. Also, for certain combinations of functions, maintenance during dam operation is more demanding. For these reasons in some cases[16] a shift occurs from multi-purpose design of large dams to design solely for power generation. Consequently, the decision on the siting of large dams is then driven by the maximization of energy supply, and disregards the potential for other functions.

Insufficient capacity of national public governance

In many developing countries, national public agencies often do not have the capacities to deal with the complexities involved in decision-making[17]. Common weaknesses are:

- the lack of adequate data and the selective use of these data, e.g. on hydrology;
- lack of capacities to conduct system based assessments and their benefits;
- lack of participative processes at strategic levels (no collaboration between energy, water, food supply, generally dominance by energy sector);
- lack of power or willingness to enforce sustainability requirements (including human rights) laid down in ESMPs.

Among civil society organisations, there is often also a lack of capacities as well as power to influence decisions. In many countries, civil society organisations are not sufficiently organised on the issue of large dams to influence public agencies. There is evidence of social movements or civil society organisations that challenge large dams being met with violence and rules and regulations that reduce civic space.

Political lock-in in favour of large dams

The above limitations may lead to insufficient justification for the construction of a large dam. The decision-making process seems to be particularly weak at the start, in the phase of strategic planning, when dams are proposed without convincing evidence that the large dam-option is more sustainable than alternative options and may meet the same needs in a better and more cost-effective way. Once key agents in a country have decided to develop a large dam, with or without sound strategic justification, there are not always sufficient counterbalancing pressures in a country that can correct the lock-in on this development option.

[16] For example, 'of the 147 hydropower projects for which the Arunachal Pradesh government in India has signed memoranda of agreement with developers only one is for a "multi-purpose" project – the 3000 MW Dibang project is referred to as "multi-purpose" because it has a flood moderation component. The rest are all single-purpose hydropower projects' (Baruah, 2012).

[17] Typically, in India the Expert Appraisal Committees under the Ministry of Environment to appraise dam projects has not disapproved a single hydropower project, in other words, there is a "zero rejection rate" of hydropower development projects, in spite of the fact that many of these dams have been contested by environmental groups and/or civil society.

5. How to develop sustainable integrated energy, water and food solutions?

If a donor would want to be cautious about large dams, first there is a need to determine if a proposed large dam will serve the needs it is designed for in the way that the developer has promised, and, second, if these needs could be more effectively met by choosing other solutions. There are number of arguments to follow this cautious approach:

Alternatives for large dams are becoming more sustainable and cost-effective

For all functions of large dams, alternatives are becoming increasingly cost-effective. For energy supply[18], the construction of large photovoltaic (PV) systems is taking-off in several African countries, as well as the construction of Concentrated Solar Power (CSP) systems[19], wind energy and sustainable biomass. The price gap between different renewable energy sources is closing, and e.g. in India and Zambia recent solar projects have become competitive with fossil fuel prices[20]. Increasingly, an energy mix of energy sources becomes feasible that can provide part of the required base load, reducing the need for new large dams to provide this base load.

Alternatives for large scale irrigation, water retention and flood management may also be available and show innovations. For instance, for irrigated agriculture drip irrigation is increasingly used, and for water supply in coastal urban areas desalinization plants are becoming more cost-effective. However, these alternatives do not reduce the need for water storage. There are also options related to ecosystem-based approaches, such as restoring groundwater recharge or utilizing wetlands for water storage and more resilient food production systems based on agro-ecological approaches and management systems[21].

Benefits of these alternative options include:

- more resilient in the long-term, in the face of climate change;
- more manageable in terms of complexity and there is scope for decentralised management, thus less sensitive to governance weaknesses;
- fewer adverse impacts and need for costly mitigation and compensation measures;

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[18] Experiences in Germany and the Netherlands among others, show that strong and smart grids combined with. current energy pricing lead to fundamentally different dynamics of supply and demand, leading to disappearance or to at least decreasing importance of traditional baseload concepts: see http://www.irena.org/DocumentDownloads/Publications/IRENA_Baseload_to_Peak_2015.pdf. For developing countries, this is often still a challenging concept. Therefore, these countries are supported in this regard through the World Bank / ESMAP programe "Variable Renewable Energy Grid Integration Support Program": https://www.esmap.org/node/56010.

[19] The NOOR project in Morocco (€ 565 million) can store solar heat in molten salts up to 4 hours (the proposed Noor Midelt project in Morocco can store solar heat for 8 hours) to produce steam for electricity generation for part of the night.

[20] Selected projects in a renewable energy auction in Peru included 162 MW of wind at an average of US$37.49/MWh, 80 MW of mini-hydro at US$46.48/MWh, 184.5 MW of solar PV at US$48.39/MWh, and 4 MW of biomass at US$77/MWh. See: http://carlosstjames.com/renewable-energy/why-the-recent-peruvian-renewable-energy-auction-was-significant-for-latin-america/; see for the Zambia case: http://blogs.worldbank.org/energy/why-zambia-s-6-cents-more-significant-dubai-s-3-cents?CID=EAE_TT_Energy_EN_EXT.

[21] Reference by one expert is also made to so-called 3R solutions to improve water supply, including recharge (of water buffers), retention and reuse of water.

- require lower initial financial investment and less time needed for construction;
- allow for direct access to and control over resources and investments by local stakeholders and therefore are likely to serve their development objectives more effectively.

Increasing discussion on large dams versus small dams

Some experts claim that large dams are the only solution to produce significant energy base loads, while also storing large quantities of water. If well developed and assessed, donors may decide that a large dam is the most sustainable option, in particular in situations of high growth of urban energy demand where few alternatives exist. Other experts argue that if dam capacity is needed, smaller dams are sometimes more attractive to investors and policy makers: large dams can easily take up to 15 years and beyond to become operational, while smaller dams (up to 100 MW) normally take 5-7 years. Also, a modular approach could be applied that combines smaller dams.[22] Moreover, some experts state that only a few suitable sites for large dams remain, and small dams will often be the most sustainable option.

Considering a transformative change

Donors may stimulate a transformative change towards a more system-based approach. Such approach takes a different point departure. It does not start from a large dam proposal, following which alternatives are investigated. But rather starts from the societal needs for energy, food and water. Then looks for the best ways of fulfilling these needs, in which large dams are one of the options. Transformative change may be encouraged by helping the decision-maker to better assess its options and their impacts before deciding to pursue a large dam. This approach can benefit from recent developments towards more system-based assessments and the possibility for donors to provide capacity building support in line with these developments (see box 3). There are good practices where more sustainable options successfully compete with large hydropower and fossil energy sources. However, there are few such experiences in 'poor governance' contexts.

Box 3. Good practices of system-based approaches

Good practices are emerging with system-based approaches that lead to more sustainable solutions (taking into consideration cumulative effects, indirect effects, alternative options, basin-wide, multi-level, nexus, …). Thus, technically, complexity should no longer stand in the way of investing in a strategic phase of public, transparent and participative decision-making based on sound assessments. Examples of system-based assessments include evaluations of the multi-functionality of dams: can they provide electricity, irrigation and drinking water as well as preserve the ecological functions of the river downstream to counter the impacts of climate change?[23] Have indirect effects on ecosystems and local peoples been adequately addressed? Tools are being developed to carry out strategic, integrated or system oriented assessments, pre-feasibility studies and cumulative studies at landscape, river basin or regional level. These may lead to energy or river basin master plans that look at available alternatives at a system level, and that assess both direct and indirect effects.

[22] Two smaller dams could significantly reduce resettlement, while providing similar project benefits. These smaller dams could be built in different periods as and when needed.

[23] As is the case for the Manantali Dam on the Senegal River in Mali, the Kandadji Dam on the Niger River in Niger and the proposed Fomi Dam on the Niger River in Guinea.

6. What can donors do?

Support transformative change where possible

Donors may support a transformative change to meet societal needs for energy, food and water, as described above. However, urgent demand for water, food and energy will remain, and a transformative change towards possible alternative options for large dams may not be easy and may take time. So what can a donor do in the short term?

Donors are advised to take a long term perspective when considering large dams and related risks. Typically a lead time of more than a decade is realistic before any contribution can be made to demands for food, water and energy, and an economic life of perhaps even 50 years. Economic costs of all risks could be calculated without bias, including alternative options, realistic risk of corruption, loss of ecosystem services and dam failure toward the end of dam lifetime. This can be directly applied to dams on which decisions are needed without causing significant delays in decision-making, and it will reduce the risk of creating a stranded asset.
However, this approach will not suffice to develop alternatives to large dams, even if the approach would suggest that these alternatives may be macro-economically more attractive than the dam option. To that end, donors should intervene much earlier in planning processes. Phases 1, 2 and 3 in Annex 1 reflect this idea: in phase 2 and 3 donors may act conditional on performance in earlier phases. This advice therefore recommends to ensure full consideration of alternatives and good practices next to a number of other possible donor interventions, depending on the results of an assessment of the "governance context risk" and the "capacity for transformative change". Depending on these two factors the intervention options are:

1. *If donors assess the governance context risk to be unacceptable*, donors may focus on improvement of governance before deciding to finance large dams. This assessment could be based on the governance track record, for example, as inferred from the number of human rights violations. The threshold level for what should be considered 'unacceptable' would be a political choice. The transformative impact of a decision not to finance a large dam by itself may be limited. In addition, a donor could perhaps have a more transformative influence by supporting civil society to demand government agencies to respect human rights.

2. *If donors assess the governance context risk to be acceptable and an assessment shows potential for transformative change*, donors may consider:
   - supporting the assessment of alternatives to large dams that could meet energy, water and food needs in a more sustainable way;
   - co-financing and building capacities on nexus studies providing inputs for strategic planning processes; Strategic Environmental and Social Assessment could be a suitable approach for such a study, also to secure sufficient transparency and participation;
   - building capacities and stimulate upstream strategic planning based on studies and assessments.

Potential for transformative change could be assessed by identifying institutions and decision-makers willing to seriously consider new approaches to meeting societal needs.

3. *In general, donors could consider stimulating understanding of sustainability and cost-effectiveness of large dams, by:*
   - supporting reviews of existing large dam projects, activities aimed at learning and study tours to countries with good practices on finding the most sustainable option;

- supporting benchmark studies, on costs and construction time for large dams; costs or land area per kWh generated; human rights violations, people displaced per dam size; success in re-establishing livelihoods etc.
- supporting the establishment of data systems that can provide baseline data needed for assessments.

In any of the above options, it would be important for donors to be consistent and coherent in the position being taken on specific large dam proposals or proposals that influence the need for large dams, in all related sectors of the donor policy and among involved donors.

Adopt a differentiated approach tailored to different phases of the planning and decision-making process

To enable strategic influence, decisions on financing large dams may be moved upstream in the planning and decision-making process, towards phases when other-than-large dam options are still possible (see box 1). However, in practice, donors are generally confronted with the large dam project in phases when these decisions have already been taken.

A possible decision-matrix for donors

The section above outlines a repertoire for donors to intervene in the planning and decision-making phases in which they are requested to participate. The decision-matrix in Annex 1 shows how a donor might assess the situation in order to determine its interventions. The DSU believes this annex to be a useful starting point for discussion and for testing by a donor.

Applying the decision-matrix in Annex 1 would require the following set of assessments done by the donor:

1. **'Governance context risk assessment':** An assessment of the current governance situation where the proposed large dam is located. Governance context risk includes the risk of human rights abuse, corruption, and underperformance during dam building and operation. For example, multipurpose dams are sometimes in practice managed as mono-purpose. Donors may reduce this risk by organizing their own inspections and site visits, but this is not always effective. Governance context assessment can be operationalised and standardised, using existing databases, for example World Bank governance indicators (e.g. see the example in Annex 3, with a set of global indices available to assess governance risks).

2. **'Assessment of capacity for transformative change':** An assessment of the existing capacities of public agencies to transform towards more attention for strategic and inclusive decision-making, the use of assessment tools to support decision-making, and nexus-oriented thinking. This assessment can be made by looking at current capacities and expertise of relevant institutions, absorption capacity, willingness to learn and improve, existing relations between the Dutch Embassy and the recipient country.

3. **'Assessment of the decision-making phase of the proposal',** asking three main questions:
   - Which of the following three phases of decision-making for the proposed large dam matches the proposal: (1) the strategic planning phase, (2) the dam identification phase, or (3) the dam preparation phase? *Note that currently in most cases this will be phase 3*.
   - Have upstream decision-making phases been adequately carried out? If not, the donor can consider to support agencies in developing upstream decision-making capacities. *Note that*

in most cases this will imply support for carrying out adequate strategic planning and dam identification.

- Have good practices been applied in assuring good quality of implementation of the current phase? If not, the donor may consider supporting the adoption of good practices for that specific phase of the proposal. Good practices of each phase are listed in Annex 2.

4. **'Assessment of the position of the donor'**: What is the position of the donor, i.e. what is its sphere of influence and what is its relation with the relevant decision-makers and stakeholders? Which interventions may be the most constructive in view of sustainable development? This may clarify the feasibility of intervention options, and the possible synergy with other donors[24].

The main options that emerge from the application of the decision-matrix in annex 1:

- *In the case of unacceptable governance context risk*: the donor may consider not financing large dams. Instead focus on options for supporting NGOs and/or decentralised agencies that have a better track record and show willingness to improve their performance.

- *In the case of an acceptable governance context risk but poor transformative capacity:* consider to support NGOs and research institutes in developing good practices on nexus approaches assessing options on their sustainability, to show their benefits and to build local capacities. If possible, move attention towards upstream planning and decision-making phases.

- *In the case of acceptable governance context risk and available transformative capacity:* consider supporting government agencies and project proponents in developing capacities on good practices within each of the decision-making phases, where possible moving attention towards upstream decision-making phases, as real transformation will take place only if changes are realised at this level. At decentralised level there could be better capacities for supporting transformative change as compared to national level agencies.

Applying the above strategy for identification of interventions, donors may be expected to gradually receive better-justified and more sustainable project proposals - that include combinations of technologies (renewable, hydro, ecosystem-based, demand based measures) - and meet the societal objectives for energy, food and access to water.

[24] What is generally the position of a donor like DGIS regarding large dam projects? DGIS would often operate on the sideline of such expensive projects (e.g. 500 million USD). There is also a current trend towards having multiple donors for a dam project. As DGIS will be a "minor" donor, it will be buffeted by decisions made (and often imposed) by the lead (often the WB). This exposes DGIS to greater risk than if it was a majority donor and "in control".

Annex 1: Large dams decision-matrix for an intervention strategy by donors

Assessment 1: Governance situation →			*Acceptable governance context risk*		*Unacceptable governance context risk*	
Assessment 2: Transformative change capacity →			*Capacity available*	*Low capacity available*	*Capacity available*	*Low capacity available*
Assessment 3: Phase of decision-making of the proposal and if good practices have been adopted			↓ *(Re)consider to:*	↓ *(Re)onsider to:*	↓ *(Re)consider to:*	↓ *(Re)consider to:*
Phase 1: System- / strategic planning	*Have good governance practices and alternatives for large dams for this phase been adopted/considered?*	***NO***	Support public agencies on phase 1 good practices and promote emergence of nexus projects and alternatives options.	Reconsider finance, support NGOs / research on phase 1 practices, finance any good nexus projects that may emerge.	Not finance a proposed large dam. Support selected institutions such as research institutions, basin-based institutions and NGOs on improved practices for strategic planning, for instance by financing case studies or research. Involve public institutions wherever possible.	Not finance a proposed large dam. Support NGOs on lobby activities to improve governance, respect of human rights and their participation in decision making.
		YES	Finance proposed next phase activities of the decision-making process.	Provide capacity building to further improve strategic planning.		
Phase 2: Dam pre- feasibility	*Has previous phase 1 been conducted satisfactorily?*	***NO***	Support public agencies to deliver phase 1.	Support NGOs / research on phase 1.		
		YES *Were good practices for this phase adopted?* ***NO***	Support public agencies to deliver phase 2.	Reconsider finance, support NGOs / research on phase 2.		
		YES *Were good practices of this phase adopted?* ***YES***	Support proposal and /or proposed next activities of the decision-making process including phase 3.			
Phase 3: Dam feasibility and design	*Have previous phases 1 and 2 been conducted satisfactorily*[25]*?*	***NO***	Support public agencies to deliver phases 1 and 2.	Support NGOs / research on phases 1 and 2.		
		YES *Were good practices for this phase adopted?* ***NO***	Support public agencies to deliver phase 3.	Reconsider finance, support NGOs / research on phase 3.		
		YES *Were good practices for this phase adopted?* ***YES***	Finance proposal. Provide soft financing for capacity and civil society development and to deliver ESMP.			

[25] E.g. has the large dam been compared to alternatives without bias, i.e. taking the energy transition into consideration, with the risk of creating stranded assets?

Annex 2: Phases in decision-making on large dams and good practice assessment

Phase	Description	Good practices of strategic environmental assessments for sustainable results
1. System / strategic planning	A need for additional energy / water / irrigation supply has been identified. Dams are being discussed / there is hydropower potential so dams are a serious option.	• Sound and participatory needs assessment considering the energy transition and alternative energy option, leading to sector- and inter-sectoral master plans and strategies, in the energy sector these include energy baseload issues and whether the power network is available • System-based environmental and social assessments, that look at multi-functionality of options (energy, water, food security), different technical options (of dams and other techniques, alone or in combination), including assessments of institutional requirements at different levels and within relevant sectors • Regional (multi-country) assessments that look at cross-boundary effects, regional instability as well as opportunities to share resources
2. Dam pre-feasibility	Dam studies are being initiated, it is the further exploration of a dam option, but different configurations can still be decided. The dam option investigated may be part of a mix of technologies.	• Assessments of the multi-functionality of the dam and its consequences for construction and operations • Siting studies, to study different dam options (size, location, number) • Studies that look at the mix of technologies, to assure baseload and equitable and sustainable service delivery • Watershed / basin-wide studies, at least looking at cumulative effects • Study of the mix of different technology options, reinforcing each other -*includes dam rehabilitation* • Strategic environmental assessment of dam options (SEA)- to help decide on best option), including safety and resettlement aspects • Assessments of climate change risk (should be integrated in SEA)
3. Dam feasibility and design	The preferred dam configuration has been selected and for this option a project proposal is being prepared.	• Detailed HSAP assessment • Detailed environmental and social assessment (ESIA), resulting in an ESMP • Dam rehabilitation studies • Resettlement action plans that offer just compensation, secure rights to resources and guarantee sustainable livelihoods • Feasibility studies • Financing for ESMP formally confirmed at same time as financing for infrastructure

Annex 3: Sources for a governance context risk assessment

To carry out a governance risk assessment use can be made of existing experiences and information sources.

Relevant information sources are the following:

- World Bank: Worldwide Governance Indicators – governance indicators for 215 countries, for six dimensions of governance: Voice and Accountability; Political Stability and Absence of Violence; Government Effectiveness; Regulatory Quality; Rule of Law; Control of Corruption. http://info.worldbank.org/governance/wgi/index.aspx#reports (click on table view tab and select Country)
- World Bank Harmonized List of Fragile Situations. http://siteresources.worldbank.org/EXTLICUS/Resources/511777-1269623894864/FY15FragileSituationList.pdf
- Human Rights Watch: http://www.hrw.org. Select country reports
- Global Witness: www.globalwitness.org Search on website for [country] + 'human rights'
- Transparency International Corruption Perceptions Index. Based on expert opinion, the Corruption Perceptions Index measures the perceived levels of public sector corruption worldwide. http://www.transparency.org/
- Amnesty International Annual Report: The state of the world's human rights –information on key human rights issues, including: freedom of expression; international justice; corporate accountability; the death penalty; and reproductive rights. https://www.amnesty.org/en/documents/pol10/2552/2016/en/
- The Global Peace Index. Published by the Institute for Economics & Peace, This index is the world's leading measure of national peacefulness. It ranks 163 nations according to their absence of violence. It's made up of 23 indicators, ranging from a nation's level of military expenditure to its relations with neighbouring countries and the level of respect for human rights. http://static.visionofhumanity.org/sites/default/files/GPI%202016%20Report_2.pdf

A relevant process to assess governance risk was developed by FSC (Forest Stewardship Council) by their approach of a National Risk Assessment (NRA), by which areas are designated as either 'low risk' or 'specified risk'. To carry out these assessments the FSC has developed an NRA framework, with the 4 following components – for each component the framework provides a list of useful references and websites where information can be acquired to undertake the assessment:

- Country governance context (level of corruption, governance, lawlessness, fragility of the State, freedom of journalism, freedom of speech, peace, human rights, armed or violent conflicts by or in the country)

- Assessment of any forestry sector associated with violent armed conflict, including that which threatens national or regional security and/or is linked to military control.
- Assessment of whether in the country labour rights are respected, including rights as specified in ILO Fundamental Principles and Rights at work.
- Assessment of whether in the country the rights of Indigenous and Traditional Peoples are upheld.

NRAs have been carried out for a range of countries and the results are publicly available. *References are the following:*

- https://ic.fsc.org/en/our-impact/program-areas/controlled-wood-01/controlled-wood-risk-assessments (overview of approach)
- https://ic.fsc.org/en/our-impact/program-areas/controlled-wood-01/controlled-wood-risk-assessments/consultation-on-the-centralized-national-risk-assessment (overview of all assessments that have been done so far).