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# Thinking about Energy Differently in ADB Projects

## Challenges of working in the food, water, energy nexus

Insight Series #1

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# Contents

## EXECUTIVE SUMMARY

In September 2013, Asian Development Bank (ADB) released the document 'Thinking about Water Differently, Managing the Water-Food-Energy nexus' (TaWD). This document explicated the linkages, or the nexus, between the water, food and energy sectors in the Asia-Pacific region. TaWD suggested ways in which the ADB could employ "systems thinking" to better understand this nexus. That is, looking at a whole system rather than its individual parts, to improve efficiencies and equitable access of projects and ensure their environmental and social sustainability. Ultimately, TaWD purports that this type of thinking will help address poverty in the region better than the current approach where sectors operate independently.

The TaWD document alludes to a broad range of projects covering energy, water and agriculture sectors. This document focuses on energy projects because the area is a priority for ADB and its developing member countries. Because of Australia's current political interests, this document limits its scope to The Philippines, Indonesia and The Pacific.

Nexus thinking is a type of "systems thinking" conceiving of each of the food, water, energy sector as different pieces of the same puzzle. It contends that conceiving of them as such will help maximise their potential to provide outputs with greater sustainability and fewer negative effects on the environment. It theorises that independently managing each sector only serves to provide negative feedback loops on itself. ADB suggests nexus thinking is needed to help meet energy, water and food demands of a population that is going to grow to 9 billion by 2050. Other factors complicate our ability to meet these demands, including increasing rates of pollution and climate change. Increasing demand on resources is facilitated by increasing wealth. Traditional management practices which do not include nexus thinking result in trade-offs between sectors: one sector is prioritised over the others, it damages other sectors' productivity, which can theoretically be avoided if nexus thinking is employed.

The document attempts to explore to what extent nexus thinking is already evident in ADB projects. In Indonesia, the energy sector is currently defined by lack of adequate infrastructure to meet demands. ADB projects are focused on traditional methods of energy generation. Generally ADB energy projects in Indonesia have failed to employ nexus thinking to date. In the Philippines the energy sector is defined by a lack of domestic demand, and supply which still fails to meet these restricted demands. Projects in the country cover both renewable and traditional energy generation but green credentials and nexus credentials are being undermined by continued pursuit of traditional fossil fuel emitting methods. In the Pacific, energy projects are aimed at reducing reliance on expensive, imported fossil fuels and while projects here are more environmentally friendly than projects in the other two countries, they also fail to employ nexus thinking. Because of this lack of nexus thinking, trade-offs are being made without all the available information. The document then goes on to suggest ways in which nexus thinking could be employed.

There are a number of ways that nexus thinking could be incorporated into the ADB. Some of these ideas are focussed around institutionalising improved learning and sharing of knowledge, and changes to current environmental governance practices. In addition to these, there are methods which suggest ADB integrate nexus thinking into their projects and ensure that it stays there, these can be applied at both the policy and project level.

The documents concludes that nexus thinking is not yet evident in ADB projects, despite their proclamations to do so in the future, and the projects are suffering for this. There is hope, with a number of suggestions on how the ADB may be able to include and institutionalise this theory in the future.

## Further Reading

This document draws together information, comparisons and case studies from many different sources. If you would like to follow up on a point or a reference you can do so in the bibliography which has document details and access points where necessary/ appropriate. There were however a number of sources that were particularly helpful in shaping my understanding of the issue and if you are interested in learning more, I recommend:

Bazilian, M., Rogner, H., Howells, M., Hermann, S., Arent, D., Gielen, D., & Yumkella, K. K. (2011). Considering the energy, water and food nexus: Towards an integrated modelling approach. *Energy Policy*, 39(12), 7896-7906.

Scott, C. A., Pierce, S. A., Pasqualetti, M. J., Jones, A. L., Montz, B. E., & Hoover, J. H. (2011). Policy and institutional dimensions of the water–energy nexus. *Energy Policy*, 39(10), 6622-6630.

UNESCAP, (2013), Water, Food and Energy nexus in Asia and the Pacific. Bangkok, Thailand http://www.unescap.org/resources/status-water-food-energy-nexus-asia-and-pacific

West, P. C., Gerber, J. S., Engstrom, P. M., Mueller, N. D., Brauman, K. A., Carlson, K. M., ... & Siebert, S. (2014). Leverage points for improving global food security and the environment. Science, 345(6194), 325-328.

# INTRODUCTION

## Thinking about Water Differently

*Note: All dollar amounts are in United States' dollars, as per ADB's publications.*

In September 2013, Asian Development Bank (ADB) released the document 'Thinking about Water Differently, Managing the Water-Food-Energy nexus' (TaWD). This document explicated the linkages, or the nexus, between the water, food and energy sectors in the Asia-Pacific region. TaWD suggested ways in which the ADB could employ "systems thinking" to better understand this nexus. That is, looking at a whole system rather than its individual parts, to improve efficiencies and equitable access of projects and ensure their environmental and social sustainability. Ultimately, TaWD purports that this type of thinking will help address poverty in the region better than the current approach where sectors operate independently.

This document is prepared with the aim to help Sustineo better understand ADB's strategies and operation in countries where Australia has economic and political interests. Considering the release of the TaWD document and the potential for improved outcomes by taking up its suggestions, it is likely that ADB will incorporate many of its recommendations in its future projects. This paper aims to better inform Sustineo of the importance of nexus thinking, its possible implications and to what extent it has already been taken up by ADB.

In trying to learn more about ADB's uptake of "systems thinking" or "nexus thinking" to date, the research here has been narrowed down to focus on energy projects alone. The TaWD document alludes to an extremely broad range of projects covering energy, water and agriculture. To focus on all these sectors would be beyond the scope of this paper. Rather, this paper will explore the way in which nexus issues emerge around energy projects. Extending access and quality of energy services is a priority for many countries in the region,[1] but this process will require careful navigation of the energy sector's use of land and water. Business as usual estimates suggest that the Asia Pacific's energy demands will increase by 2.1% per year, to 2035,[2] compared to the projected world average of 1.5%.[3] This predicted increase equates to around 8,358.3 Mtoe (Million tonnes of oil equivalent). In an alternative scenario, where 'advanced technologies' (including 'green' technologies) are used, this rate of growth is 1.4%, or 1,295.2Mtoe less. In either case, projects working on continued gains in efficiency and the transition to renewable energy technologies will continue to hold the attention of ADB and as such warrant further analysis here.

This paper looks exclusively at energy projects in three case studies: Indonesia, the Philippines and the Pacific region. In Indonesia, energy projects attract 14.7% of ADB funding to the country with only public sector projects (at 18%) attracting more.[4] In the Philippines, energy projects attract 23% of ADB funding, the highest percentage of any sector (Public sector projects come in second with 22% of ADB's Philippine funding).[5] In the Pacific region, the contribution of ADB funds to energy projects varies between different countries and there is an overlap between energy and public sector projects. This means energy related projects are not always primarily classified as such.[6] These differences between classifications of projects reflects different priorities of different governments. Overall, energy projects are an interesting focus for further study: they attract larger

[1] ADB, 2013, Thinking About Water Differently, Manila, Philippines
[2] Energy Statistics, ADB http://www.adb.org/sites/default/files/energy-statistics-pamphlet.pdf
[3] As above.
[4] ADB Lending, http://www.adb.org/countries/indonesia/main
[5] Number of Loans per Sector http://www.adb.org/countries/philippines/main
[6] Institutional Strengthening of the Nauru Utilities Corporation http://www.adb.org/projects/47352-001/main

amounts of finance from the ADB than other sectors; they are larger in scope and scale of project, and they are more numerous than water or agriculture/natural resource projects.

Three areas were chosen for this study. Indonesia was chosen as it is here that much of Australia's current political attention is drawn. In the last 3 years the Australian government has been involved in controversies with Indonesia, but has also committed to continued work in the archipelago across multiple sectors. Official sources say Indonesia is one of Australia's "most important bilateral relationships"[7] as the two countries cooperate on issues such as business, trade, education, defence and security. Australia gives more aid to Indonesia than any other nation.[8] Indonesia is of great interest to Australia, a recipient of large amount of ADB funding and therefore of great interest to Sustineo.

The Philippines is also of interest because it's the home of the ADB and the centre of its geographical reach. Australia is one of the biggest contributors to the Philippines' aid program,[9] with its aim being to increase regional security by reducing poverty. Australia has recently committed to a long term relationship with the Philippines by way of their new "aid for trade"[10] program. As a result of Australia's ongoing engagement with, and the amount of funding the Philippines receives from ADB, the Philippines also features in this study.

The Pacific was chosen because of the Australian government's interest in the region. As a group, Pacific countries have similar energy profiles and attract less funding from ADB so for this analysis the region is observed as a whole. This grouping does not intend to simplify or ignore the diversity of the region, also noting that ADB similarly classifies the region[11]. Although the ADB counts 14 nations in The Pacific- this analysis it will be restricted to The Marshall Islands, Papua New Guinea (PNG) and to a lesser extent Fiji, Tonga and the Cook Islands, as these are the countries in the region with the biggest ADB energy projects. Australia's interest in the Pacific is not only related to security[12] and aid, but also emerging economic and business opportunities. Australia also has interests in outsourcing refugee resettlement to Nauru.[13] Australia constitutes the largest trading partner for many Pacific nations and therefore holds a degree of political and economic influence over regional issues. Australia's potential role in both aid and trade in the Pacific means it is valuable for Sustineo to develop a deeper understanding of the area.

The next section will explore ADB's expectations of what nexus thinking can achieve. Following this, the section provides a theoretical background on nexus thinking, exploring challenges facing the water, agriculture and energy sectors and specific examples of trade-offs threatening resource security.

# WHAT IS A NEXUS?

## Theory

The TaWD document suggests that nexus thinking is a potential solution to effectively address a range of future challenges that the Asia Pacific region faces. These challenges include increased demand on food, water and energy resources, the future adverse impacts of climate change scenarios and scenarios of changing patterns of consumption. An understanding of the current state

[7] Indonesia Country Brief http://www.dfat.gov.au/geo/indonesia/indonesia_brief.html
[8] Program Allocations, DFAT http://aid.dfat.gov.au/Publications/Documents/program-allocations.pdf
[9] Republic of the Philippines Country Brief http://www.dfat.gov.au/geo/philippines/philippines_brief.html
[10] Aid for Trade, DFAT http://www.dfat.gov.au/trade/aid-for-trade/
[11] ADB, 2014, Pacific Energy Update
[12] Republic of Fiji Country Brief https://www.dfat.gov.au/geo/fiji/fiji_brief.html
[13] Nauru Country Brief https://www.dfat.gov.au/geo/nauru/nauru_brief.html

of water, food and energy sectors is needed inform an appreciation of nexus thinking. This section will briefly explore ways each sector, including water and agriculture are impacted by the others, broadly describing how nexus issues emerge. From this analysis, complicating factors and stressors on common to each sector appear. Complications are then explored in more detail by looking at specific examples of trade-offs between sectors being made without incorporation of nexus thinking. These examples will be drawn from around the world, to achieve a deeper understanding of the myriad of variety of ways trade-offs between food, water and energy sectors are experienced. Nexus thinking is then proposed as a solution to these trade-offs and challenges, and the guiding principles- 'a systems approach'- of such thinking are briefly explored.

Current methods of water management are unsustainable. Climate change threatens access to water resources by altering historical patterns of precipitation and evaporation.[14] Pollution levels in water systems have increased to dangerous levels in recent decades, not only in oceans[15] but in rivers, lakes and groundwater sources[16]. In Pacific nations, seawater incursion to groundwater threatens fresh water resources.[17] Complicating these issues further is the projected increase in global population to 9 million and the demands such growth will make on already stressed resources. Indonesia's population is predicted to increase from 250 million to 300 million to the year 2050, and in the same period the Philippines is expected to grow from 100 million in 2013 to 150 million in 2050. The population of the Pacific is projected to almost double from 10 million to 18 million in 2050.[18] Coupled with a growing middle class who are driving increasing rates of protein and meat consumption, population increase will place more strains on water management by way of its contribution to agricultural outputs.[19] Despite stressors, there is scope for usage patterns to adapt to a changing world. As much as 70% of water withdrawals (from the natural water cycle) are used for food production, and there are estimates that up to 50% of this water can be used more efficiently[20]. Water usage patterns must adapt to meet the needs of, and support a changing world, and the food production industry must play a big role in this. Under current management practices, future demand cannot be met, and trade-offs with food and energy sectors will continue.

The agriculture industry faces similar challenges to the water sector. Climate patterns will change, affecting weather and in turn changing viability of some areas of traditional agricultural production.[21] Land degradation and pollution of agricultural production areas are increasingly problematic and are often caused by the agriculture activities themselves through misuse of fertilisers and mismanagement.[22] Widespread patterns of land use changes such as biofuel

[14] http://www.scientificamerican.com/article/climate-change-is-altering-rainfall-patterns-worldwide/
[15] http://www.ecotanka.com/media/united_nations_report_on_plastic_debris.pdf
[16] http://www.climate.org/topics/water.html and Dong, Y., Liu, Y., & Chen, J. (2014). Will urban expansion lead to an increase in future water pollution loads?—a preliminary investigation of the Haihe River Basin in northeastern China. *Environmental Science and Pollution Research*,*21*(11), 7024-7034. And Ebenstein, A. (2012). The consequences of industrialization: Evidence from water pollution and digestive cancers in China. *Review of Economics and Statistics*, *94*(1), 186-201.
[17] Laattoe, T., Werner, A. D., & Simmons, C. T. (2013). Seawater Intrusion Under Current Sea-Level Rise: Processes Accompanying Coastline Transgression. In *Groundwater in the Coastal Zones of Asia-Pacific* (pp. 295-313). Springer Netherlands.
[18] Bedford and Hugo, 2012, Population Movement in the Pacific: A perspective on future projects. Dept. of Labour, Wellington, NZ.
[19] World Economic Forum Water Initiative. 2011. Water Security: the Food-Water-Energy-Climate Nexus. Geneva.
[20] Page vi. Asian Development Bank. 2013. Thinking about Water Differently, Managing the Food-Water-Energy-nexus. Manila
[21] Southworth, J., Randolph, J. C., Habeck, M., Doering, O. C., Pfeifer, R. A., Rao, D. G., & Johnston, J. J. (2000). Consequences of future climate change and changing climate variability on maize yields in the midwestern United States. *Agriculture, ecosystems & environment*, *82*(1), 139-158.
http://iri.columbia.edu/~ines/My_IRI_ProjectsO/StochDisagRef/corn-published-agee.pdf
[22] http://www.climate.org/topics/agriculture.html

production or urbanisation also put pressure on the industry as they demand land that can then no longer be used as agricultural space due to physical occupation or pollution.[23] The agriculture and subsequent food production industries face similar problems to the water sector as other users not only encroach on their physical space but also on the availability of inputs. The water sector is similarly exposed to trade-offs which preference one sector at the expense of others.

The energy sector faces some similar and some very different challenges to the water and food sectors. The biggest challenge of energy sectors worldwide is to reduce their emissions of carbon dioxide. This is being attempted to both reduce the effects of the industry on anthropogenic climate change and to avoid increasing economic and environmental costs[24] associated with increased rates of greenhouse gasses in the atmosphere. Failure to reduce emissions will negatively impact food and water sectors. The transition to lower emissions also places stresses on other sectors, for example through increased use of hydropower and biofuels. Around the world energy sectors also face challenges such as deteriorating infrastructure,[25] informal or unauthorised use,[26] exponentially growing demand and of course, trade-offs between sectors.

Having briefly explored the challenges each sector faces, it is clear that current management practice will not be able to cope with these challenges nor be able meet increasing demand. Trade-offs are big contributors to these tensions. When two or more of the food-water-energy sectors meet, there are frequently trade-offs to be made. One sector will benefit more from the interaction than the other will. With an aim of better exploring both project specifics and negative externalities, some examples of trade-offs follow. Despite the focus of this document on the Philippines, Indonesia and The Pacific, examples will be drawn from around the globe to further widen the understanding of nexus issues.

A number of these tensions and trade-offs between food-water-energy can be seen in the Awash basin in Ethiopia. In the basin in the mid North-West of the country, hydropower is a large contributor to energy generation. But it remains underutilised, partially because of mismanagement and partly because of under investment by the government.[27] In an attempt to meet the population's growing energy demands, some farmers have started growing sugarcane for biofuel.[28] In parts of the Awash basin cotton crops are being converted or replaced with sugar cane. This shift has not detracted any land from food production, but sugar cane has a larger consumptive use of water than the previous cotton crops. The increased use of water by the sugarcane crops diverts water that was previously used for food production. National politics favouring sugarcane production for energy mean that farmers are allowed to divert large amounts of water for such uses. As energy generation increases, along with its consumptive use of water, food production in the region suffers because of diverted water resources. Trade-offs in this case are made at either a local level through choices of land holders, and are allowed to continue unabated by a complicit national government. If these patterns of water allocation continue they may threaten food production in the region. This is not a decision that has been made consciously.

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[23] Matuscheke, 2009 Rapid urbanization and Food Security, International Association of Agricultural Economists Conference, Beijing, China 2009 from http://www.new-ag.info/en/news/newsitem.php?a=1948

[24] OilPrice.com, 2011, http://oilprice.com/Energy/Energy-General/Rising-Cost-Of-Fossil-Fuels-And-The-Coming-Energy-Crunch.html

[25] Laldjebaev, M. (2010). The water–energy puzzle in Central Asia: the Tajikistan perspective. *Water Resources Development*, *26*(1), 23-36.

[26] Smith, T. B. (2004). Electricity theft: a comparative analysis. *Energy Policy*,*32*(18), 2067-2076. http://www.forbes.com/sites/peterdetwiler/2013/04/23/electricity-theft-a-bigger-issue-than-you-think/

[27] Beyene, Teferra, and Michael Abebe. "Potential and development plans in Ethiopia." International Journal on Hydropower And Dams 13.6 (2006): 61.

[28] Cornick et al., 2008 Water–food–energy–environment synergies and tradeoffs: major issues and case studies, Water Policy 10 Supplement 1 (2008) 23–36

In the Awash Basin in Ethiopia, energy production threatens food security through consumptive uses of water. The example of hydropower development in the Lower Mekong Basin (LMB) threatens food security in a different way. Proposed dams will disrupt the migratory cycles of 35% of fish in the Mekong, reducing their population numbers and restricting allowable catch by local communities. The modelled loss of fish stocks in the region threatens food security because local communities are reliant on fish stocks from the river for important components of their diet, protein.[29] Other scenarios for replacing this loss of food and protein have been demonstrated to be not viable. In this case, lack of nexus thinking in water management planning, threatens to diminish food stocks to dangerous levels.[30] In this case, trade-offs are decided on at national government and LMB regional levels[31] where hydropower plans are made. This case demonstrates a different trade-off: one sector dominating another, and threatening food security in new ways.

Trade-offs between food, water and energy can also be made at local levels. In Afghanistan and Nepal, biomass in the form of cattle dung is a popular source of household energy.[32] It is increasingly burnt as fuel for stoves and cooking, as traditional sources of fuel (firewood from forests) are being depleted. In this process of transitioning from one source of fuel to another, trade-offs are made by households who divert biomass away from its previous use. As biomass is diverted from its previous use as a fertiliser, to be used as an energy source, synthetic fertilisers are often brought in to replace nutrients for crops. These synthetic fertilisers in turn, consume large amounts of energy in their production phase.[33] Waterways can suffer from misuse of these products (a process called eutrophication).[34] In turn, aquatic ecosystems suffer from species loss, effecting food security and it becomes more difficult to extract water for human use.[35] In this case, while national or regional bodies could incentivise (or disincentivise) change, the decision ultimately rests with the farmers' own priorities and knowledge of ecosystems. Ease of access to energy is being prioritised over water use and water for food production.

These examples show us how trade-offs are made inadvertently and that decisions regarding trade-offs are made at local, regional or national levels. These trade-offs must be managed alongside a number of challenges which are forecast to disrupt our ability to operate food, water and energy sectors in a business as usual scenario. Globally, climate change and pollution threaten agricultural production. Water availability and access are threatened by mismanagement, growing demands and changing climatic patterns (geography and intensity) of the water cycle. Energy sectors around the world will need to decarbonise and increase efficiency to be able to meet growing demand. Compounding these environmental challenges are demographic ones. There is a burgeoning global population, set to hit (and peak) at approximately 9 billion in 2050, a growing middle class in emerging economies with collectively increased buying power (changes in food consumption will result), and the unknown ramifications of quickly increasing amounts of carbon in the atmosphere.

In addition to these less controllable factors, food, water and energy sectors are also being threatened by trade-offs. While difficult to manage, there is potential for trade-offs to be navigated better, by employing nexus thinking. While environmental and demographic pressures build, tensions and trade-offs between the food, water and energy sectors remain obscured, ignored and unknown, bringing inefficiencies and increased costs to multiple ADB projects.

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[29] Orr et al., 2012 Dams on the Mekong River: Lost fish protein and implications for land and water resources. Global Environmental Change 22 (925-932)

[30] As above

[31] Including the Mekong River Commission.

[32] Pant 2010, Health costs of dung cake fueluse by the poor in rural Nepal. South Asia Work of Economic Research Institutes

[33] Rasul, 2014 Food, water and energy security in South Asia: A nexus perspective from the Hindu Kush Himalayan region

[34] http://www.fao.org/docrep/w2598e/w2598e06.htm

[35] http://www.fao.org/docrep/w2598e/w2598e06.htm

## Nexus thinking in the ADB

ADB's TaWD document suggests that ADB can overcome many of these challenges by conceptualising each of the food, water, energy industries as part of a "nexus" which sees overlaps between the three. This 'nexus thinking' is a type of 'systems thinking' which sees issues as pieces of the same puzzle. Conceived this way, solutions become viable only once they have acknowledged this overlap and interconnectedness.

Systems thinking says each system, in this case the food-water-energy nexus, has its own dynamics and that each system is interconnected with others. Systems thinking says that from outside a system one may affect a change in behaviour by applying pressures, for example changing inputs or restricting or demanding outputs. With regard to the nexus this means we can manage each sector separately but it will remain interlinked to the others even if managers fail to conceive of it that way. The system has characteristics which determine its behaviour; outside factors only influence which characteristic will dominate or affect behaviour. Managing each sector separately not only ignores influence of other sectors, but it fails to predict a large range of possible future scenarios, whereby reducing the resilience of a sector. While all possible scenarios cannot be predicted, systems thinking provides a more comprehensive understanding than a silo approach (that is each sector operating in its own metaphorical silo) which makes it so important. By acknowledging each sector's place in a system, that sector can be managed with the best knowledge of possible interactions with the world outside. Therefore by applying nexus thinking, a sector is able to reduce negative externalities that will eventually only negatively feedback on itself. This approach differs significantly to more traditional approach which aims to grow one sector regardless of the impact of that growth on another.

ADB has recently embraced this nexus thinking in its public discourse and is optimistic as to what it can achieve. Planning which spans sectors, employing nexus thinking, is thought to be able to reduce tensions and trade-offs between each sector and the community. Reducing such tensions is hoped to allow more equitable access to the products (or outputs) of each sector, whereby increasing security of the supply of the product. Such nexus informed management approaches are thought to reduce inefficiencies in the operation of each sector. TaWD suggests that costs could be reduced, community support could be achieved. Through management which incorporates nexus thinking, sectors may be able to improve environmental outcomes of projects. Increased awareness of one sectors' effects on another creates an understanding of the feedback loops involving environmental services to each. Effective nexus thinking has the potential to improve the management and operation of food, water and energy sectors, whereby affecting improved outcomes for each.

ADB has in their TaWD document, taken heed of the potential benefits of nexus thinking purported by the literature. The document indicates that they intend to take up nexus thinking to achieve improved outcomes in all of the directions discussed above. They recognise the "critical role" they play in "securing future water for the region"[36]. Given that banks are conservative institutions, not known for their hasty decision making, coupled with the strong language in TaWD recommending nexus thinking to ADB and their projects, it is reasonable to expect some uptake of this nexus thinking before it makes its way into official ADB policy or safeguards. Considering these expectations, the following section will analyse specific projects to look for elements of nexus thinking to date.

[36] ADB, 2013, TaWD, p.viii

# PROJECT ANALYSIS

## Case Studies

As indicated in the introduction, the focus of this project has been restricted to energy projects in Indonesia, the Philippines and the Pacific region. This restriction is to allow greater focus on individual projects, to gain an in-depth understanding of the way in which these issues emerge and to better direct further research. This section will look at specific examples of energy projects in Indonesia, the Philippines, PNG and the Marshall Islands to determine to what extent nexus thinking may already be evident in ADB projects, and to explore the extent of trade-offs being made between food, water and energy sectors.

### Case Study 1: Indonesia

The Indonesian energy sector is largely defined by a lack of adequate infrastructure. They are the world's biggest exporter of coal,[37] although increasing domestic demand is slowly reorienting trade routes. Previously, up to 75% of coal was exported, now this number is falling as domestic demand rises and total production decreases due to aging infrastructure.[38] This decrease in production has led to an increase in imports of petroleum products to meet growing demand. Aging infrastructure coupled with a complex regulatory environment has seen much needed investment in the sector fail to appear. Despite this lack of investment, natural gas mining and usage continue to grow. In the case of natural gas, both domestic consumption and exports are growing in tandem.[39] Increasing domestic demand and a lack of investment define the Indonesian energy sector.

The ADB Indonesia Country Strategy aims to align itself with the government of Indonesia's own development plan. As a result, ADB's priorities are guided by those of Indonesia.[40] With regard to the energy sector, shared approaches to the sector include a "greening" of projects, and "improving energy efficiency and conservation, mainstreaming and diversifying clean energy sources, and reducing carbon dioxide emissions"[41]. The three specific projects of support from ADB to Indonesia include a geothermal plant, improved efficiency of existing systems and advocacy for renewable energy. The Country Strategy makes no mention of a nexus approach, or of the energy sectors' intersection with food or energy.

As the table below shows, since ADB started working with Indonesia in 1966, energy projects have attracted almost 15% of funding, with only public sector management projects attracting a higher percentage. Thirty six energy projects have been completed or are currently underway. Only transport and agriculture/natural resources have had more projects in their sector, although neither of these sectors received more funding than energy. The energy sector in Indonesia is an area of great interest to ADB.

The following table shows ADB spending on energy projects in Indonesia as a total amount and as compared to other sectors:

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[37] Energy Information Administration, International Energy Statistics, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm

[38] https://energypedia.info/wiki/Indonesia_Energy_Situation

[39] http://www.eia.gov/countries/country-data.cfm?fips=id http://www.eia.gov/countries/cab.cfm?fips=id

[40] Country Partnership Strategy, Indonesia, ADB. http://www.adb.org/sites/default/files/cps-ino-2012-2014.pdf

[41] See footnote #36

| Table #1 | | | |
|---|---|---|---|
| Indonesia: Cumulative lending, and Grants Financed by ADB Special Funds, By Sector (1966-2013) | | | |
| Sector | # of projects | Total amount (US $million) | % |
| Agriculture and Natural Resources | 100 | 4,092.52 | 13.88 |
| Education | 33 | 2,297.35 | 7.79 |
| Energy | 35 | 4,354.55 | 14.77 |
| Finance | 23 | 4,086.10 | 13.86 |
| Health and Social Protection | 13 | 1,068.30 | 3.62 |
| Industry and Trade | 12 | 645.7 | 2.19 |
| Multisector | 21 | 1,993.22 | 6.76 |
| Public Sector Management | 21 | 5,324.97 | 18.06 |
| Transport and ICT | 36 | 3,593.86 | 12.19 |
| Water Supply and Other Municipal Infrastructure and Services | 33 | 2,029.44 | 6.88 |
| Total | 327 | 29,486.01 | 100 |
| Total Disbursements | | $22,677.0 million | |

(Reference: ADB and Indonesia Fact Sheet, Dec 2013)

Since 2009, Indonesia has had more ADB energy projects than the Philippines or the Pacific. Eleven projects fit within this category and they vary dramatically. The biggest projects ranked by cost are conventional power generation facilities. A natural gas plant, power transmission infrastructure, a proposal for a geothermal power plant and an expansion of existing hydropower plant are the projects that are predicted to cost hundreds of millions of dollars. By contrast, smaller, lower cost projects differed in their focus; they were mainly capacity building, technical assistance projects, and renewable energy projects.

The large scale energy projects in Indonesia will be used as case studies to understand how ADB operates. With the ADB contributing $360 million (to a total of $510 million) to the project 'Scaling up Hydropower' is one of ADB's largest in Indonesia. This project fulfils ADB policy in answering a call for increased capacity of renewable energies including hydropower. It fails, however to incorporate nexus thinking. According to the Project Data Sheet (PDS), project is likely to displace an unknown (or perhaps only unpublished) number of indigenous and non-indigenous people, across 3 ethnic groups, and these people will be resettled under provisions in ADB's Social and Environmental Safeguards Policy. However, the land these displaced persons used for the food production, and the food gathered from a river without this dam expansion has not been factored in to the

compensation these people will receive. Likewise, no projections of the change to their food security have been completed.[42] Such a projection was, however completed for a dam in the Mekong River. The study by Orr et al. demonstrates that in the case of the Lower Mekong Basin, significant reductions to food security of the region would be a direct and unavoidable impact of constructing this dam. This is considering that 47-80% of animal protein in derived from freshwater fisheries.[43] Modelling was completed to determine if various substitutes would provide a sufficient alternative, and in this case none would fulfil needs. The extent to which these soon to be displaced communities rely on these freshwater fish sources, is unknown. Given the magnitude of the disruption to food sources in Orr's example, and because ADB is adopting a nexus approach, they should be exploring similar scenarios in their own projects. Additionally, because The Nexus features heavily in current academic discourse, an absence of consideration these aspects of project impacts suggests lack of research or engagement with academia and experts in the field.

The Tangguh Liquid Natural Gas (LNG) project makes similar cursory glances to the ADB Energy Policy. As far as project documentation describes, current ADB environmental safeguards are in place and adhered to. But the project itself is facilitating the consumption of a substance that is directly contributing to climate change. The project has no aspect of using renewable energy, nor does it plan to reduce reliance on this polluting product. Liquefied natural gas is approximately 30% less polluting than other fossil fuels, [44] and as such is considered environmentally friendly by some.[45] Perhaps judgement on this project, and whether it is in line with ADB's Energy Policy and Country Strategy, depends on one's views on LNG. Despite being cleaner than coal or petroleum products LNG contributes to fossil fuel emissions and is not safe to transport[46] as demonstrated by a number of recent, lethal accidents in India. In our current financial, technological and meteorological environment cleaner options for energy generation exist *and* are readily accessible. ADB has a responsibility to utilise them to the fullest extent. The Tangguh Liquid Natural Gas projects displays no aspects of nexus thinking and deviates far from the nexus principles of sustainability by continuing to pursue polluting sources of energy generation.

ADB's recent energy projects in Indonesia both conform and deviate from their own policies. Neither an appreciation for, nor an uptake of nexus thinking is immediately visible, although it is perhaps too early to expect one. ADB is attempting to reduce environmental impacts with renewable energy sources such as hydropower and geothermal. There are arguments that liquid natural gas is and environmentally safe option, too.[47] Despite these efforts to pursue clean energy, elements of nexus thinking are still missing. Renewable energy is being pursued but trade-offs are still being made; hydropower is developed with no regard for food security, LNG is pursued because it's less polluting than other sources (but with little consideration for local ecosystems[48] or their role in food production or water security). ADB's energy projects in Indonesia do not display any evidence of nexus thinking.

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[42] http://www.adb.org/projects/46165-002/main

[43] Hortle, K.G., 2007. Consumption and the Yield of Fish and Other Aquatic Animals from the Lower Mekong Basin. Mekong River Commission, Vientiane, Lao PDR.

[44] http://www.eia.gov/energyexplained/index.cfm?page=natural_gas_environment

[45] http://www.appea.com.au/industry-in-depth/policy/greenhouse/how-natural-gas-can-minimise-greenhouse-emissions/ and http://www.aplng.com.au/home/cleaner-energy

[46] http://thinkprogress.org/climate/2014/06/27/3454015/natural-gas-pipeline-explosion-india/

[47] Centre for Liquefied Natural Gas http://www.lngfacts.org/about-lng/environment/

[48] Mott McDonald, 2012, Tangguh LNG Project, E&S External Panel II, 1st Operational Compliance Monitoring Report, BP Berau - Project Financiers

## Case study 2: the Philippines

The Filipino energy sector is characterised by low consumption rates. Despite this, the Philippines remain a net importer of energy. Methods of domestic energy generation are diverse, with local production of oil, natural gas, coal, hydropower and geothermal plants. Unlike Indonesia, the Philippines have only one ADB energy project exceeding US$100 million. The project is a construction and operation project of a conventional energy power plant. Projects involving renewable energies are smaller scale financially; these focus on technical assistance and capacity building. The following table shows ADB spending in the Philippines since 1966. The highlighted area demonstrates that large role that energy projects have played in the ADB, Philippines relationship:

Table #2

Philippines: Cumulative lending, and Grants Financed by ADB Special Funds, By Sector (1966-2013)

| Sector | # of projects | Total amount (US $million) | % |
|---|---|---|---|
| Agriculture and Natural Resources | 61 | 2,010.43 | 13.94 |
| Education | 8 | 252.06 | 1.75 |
| Energy | 32 | 3,384.70 | 23.47 |
| Finance | 22 | 1,366.00 | 9.47 |
| Health and Social Protection | 7 | 367.41 | 2.55 |
| Industry and Trade | 12 | 225.82 | 1.57 |
| Multisector | 12 | 1,082.30 | 7.5 |
| Public Sector Management | 11 | 3,228.00 | 22.38 |
| Transport and ICT | 30 | 1,463.85 | 10.15 |
| Water Supply and Other Municipal Infrastructure and Services | 27 | 1,042.86 | 7.23 |
| | | | |
| Total | 222 | 14,423.43 | 100.01 |
| Total Disbursements | | $11,011.5 million | |

(Reference: ADB and Philippines Fact Sheet, Dec 2013)

Since 2009 the biggest ADB energy project in the Philippines has been the Visayas Base Load project. The project covers 8.4 hectares which, operators say, was previously being used as an ash pond by a neighbouring coal fired power plant.[49] The project interacts with the local environment in a number of ways, including ash disposal, 45 000 $m^3$ of seawater will be extracted and (after treatment) discharged daily.[50] These aspects of project design superficially reflect some degree of nexus thinking. Land has been repurposed for the project, so any vegetation clearing and disruption to

[49] Korea Electric Power Corporation (KEPCO), 2009, Philippines: Visayas Base Load Power Project: Summary Environmental Impact Assessment

[50] Visayas project site: http://www.adb.org/projects/43906-014/main

communities is minimised. Seawater is used for cooling so as to avoid disturbing freshwater sources. However, on further exploration of the Environmental Impact Statement (which was written by the operator: strange given the unlikelihood of any impartiality on their part, and that such a document would normally be completed by an external contractor) it appears the driving motivation behind these decisions is not a result of any nexus thinking. Rather, it appears the site could have been chosen because of the difficulty of finding another site for such a purpose. This project has accidently absorbed some aspects of nexus thinking, avoiding trade-offs with the food/agricultural sectors when choosing a site, and the water sector through their decision to use seawater for cooling. However the fact that this project funds an energy plant built solely to consume fossil fuels, overshadows any other environmentally responsible decisions made in project planning and reduces any confidence observers may have had in ADB's nexus credentials.

(It is important to note some of the methods of the Environmental Impact Assessment [EIA] here. Monitoring of key pollutants was only conducted 3 times over the 4 years of the project covered by ADB documents,[51] and no attempts were made to standardise this testing, nor as to the state of operations at the time of testing. As mentioned before, this EIA was conducted by the owner/operators of the project which hugely reduces impartiality- something which should be aimed for in all EIAs. Standard practice involves hiring external experts to complete such an assessment. No public comment from ADB on this particular EIA process is available. This case does little to support ADB's environmental credentials)

The second largest energy project in the Philippines is the 'Philippine Energy Efficiency Project'. ADB is funding over US$31 million of the US$46 million project. The project will retrofit government buildings, distribute efficient light bulbs to homes, promote efficient building techniques and launch a public awareness campaign around energy efficiency. The programme is in line with Philippine government and ADB Country Strategy as the programme aims to reduce poverty by reducing the amount of income households spend on energy consumption so it can be spent on meeting basic needs or investments.[52] But it must be noted that this line of thinking is not articulated as nexus thinking. Perhaps nexus thinking could help discover similar efficiencies to be achieved in the future.

ADB's energy projects in the Philippines cover many methods and aspects of energy generation. Gains in efficiency and renewable energies are being pursued but development of traditional forms of fossil fuel energy generation are still being developed, undermining any 'green' credentials of ADB. Geothermal plants are proposed and renewable energies dominate ADB's Philippine Energy projects in number but not funding. ADB's Filipino Energy projects continue to reduce pollution from energy generation. But the lack of nexus thinking in projects limits possible gains in efficiency and by-passes opportunities for cross sector projects.

## Case study 3: the Pacific region (Focus on Papua New Guinea and The Marshall Islands)

For this analysis, Pacific nations were grouped together because of their collective dependence on imported fossil fuels and because ADB similarly classifies the region.[53] They share common demographic characteristics, and individually they receive much smaller amounts of funding than Indonesia or the Philippines.

The first notable difference between ADB projects in Indonesia, the Philippines and the Pacific is funding. In Pacific countries there is not a single project that reaches $100 million (although significantly smaller populations are one reason for this). In the Pacific the biggest energy project is

[51] Page 10 and 13 of the document referenced in footnote 38.
[52] ADB, 2014, Project Data Sheet- Philippine Energy Efficiency Project
[53] ADB, 2014, Pacific Energy Update

$83 million[54]. As in the Philippines, the most expensive project is an infrastructure project for conventional energy generation. In the Cook Islands, Fiji, Tonga and the Marshall Islands, efforts and projects are directed to transition away from reliance on imported diesel.[55] Capacity building features heavily amongst the Pacific projects, more so than in either of the other two case studies.

The biggest energy sector project in the Pacific is the "Port Moresby Grid Development" in PNG. It involves the roll out of the Port Moresby electricity grid and upgrades to the network. It also includes the rehabilitation of two existing dams to help meet demand. Unlike ADB development of hydropower in Indonesia, this approach will not submerge any new land, or displace any additional communities in attempts to increase energy generating capacity. (Similar projects to rehabilitate hydropower facilities are also underway in Samoa.) Similarly, another PNG project, (tranche 1 of) the "Town Electrification Investment Program" seeks to develop hydropower in the least disruptive way through "run of river" hydropower plants which do not dam, but harness energy from the flow of the river along its natural course. Hydropower developments in PNG are causing less social and environmental disruption than other ADB projects, however there is no indication of nexus thinking having influenced this decision. While minimisation of negative environmental externalities is a valuable end in itself, further benefits could be derived from the projects by incorporating nexus thinking.

In the Marshall Islands, the programme "Improved Energy Supply for Poor Households" includes 3 components, including extending connections to the power grid and installation of prepaid meters. The third component blends non-traditional, locally produced coconut oil with diesel to reduce costs of importing fuel and environmental impact. In the project data sheet, environmental impacts of the project discussed are limited to a reduction in carbon and sulphur dioxide emissions and to what extent the project will do that.[56] What is overlooked is the effect that diverting coconuts to energy production will have on their availability for use as a food source. The project documents make no mention of whether the project takes advantage of an overabundance of coconuts, or if production is being scaled up to provide a new source of biofuel. If the ADB is to take up nexus thinking then these are the types of questions that will need to be asked of projects.

Energy projects in the Pacific nations have a number of common aims. They include reducing the reliance on imported fuel sources and meeting increasing demand through renewable energy, extending access to electricity grids and capacity building of relevant governing bodies. These Pacific projects have fewer risks associated with them than ADB's energy projects in Indonesia and the Philippines: fewer risks of pollution, carbon emissions or political difficulties (involved in displacing people to make way for dams, for example). While ADB's commitment to renewable energy in the Pacific is in line with their Energy Policy 2009, and pursuing renewable energy is a valuable goal in itself, there remain possibilities for nexus thinking to illuminate further possible benefits which not only serve communities and local environments but also cross into the food and water sectors.

From this analysis of Indonesia, the Philippines and the Pacific, a number of patterns emerge:

- Over the 3 case study regions, a large amount of money is going to infrastructure of (and in some cases operating) polluting and renewable forms of energy generation plants.
- There is a large number of projects looking at renewable energy, but individually and collectively, their cost to ADB does not reach that spent on conventional (using fossil fuels) energy generation.

[54] ADB, 2014, Project Data Sheet- Port Moresby Power Grid Development Project
[55] ADB, 2014, Pacific Energy Update
[56] ADB, 2014, Project Data Sheet- Improved Energy Supply for Poor Households

These patterns within countries and between them, make an interesting comparison to the ADB's Energy Policy, updated in 2009, to which all projects in the energy sector must abide. Briefly, the policy puts an emphasis on renewables (paragraph 15) and efficiency, and while these values are reflected in many projects covered by this analysis it in the emphasis given to renewables in Energy Policy 2009 is not reflected by the amount spent on such projects. Another principle of the policy is to avoid coal mine development, but a coal fired power plant is one of the larger projects in the Philippines. The projects discussed here loosely fit within the Energy Policy (2009), however there are some disconnects. (Why this is, could be an area of further research.)

The ADB Energy Policy (2009) has some goals in common with the TaWD document. Both prioritise renewable energy, and both prioritise energy efficiency, although perhaps for different reasons (TaWD for environmental sustainability/resource security and Energy Policy 2009 for cost reduction). It is in these ways that projects begin to fulfil 'nexus thinking' but deeper engagement with the concept is otherwise lacking.

By focussing on examples of ADB energy projects we have been able to determine that nexus thinking is not explicitly present in current projects. This lack of nexus thinking means that in some cases trade-offs between food, water and energy sectors are being made without all the available information being considered. TaWD purports that incorporating nexus thinking can prevent trade-offs or ensure they are decided upon with as much knowledge as possible. Certainly the incorporation of nexus thinking at an institutional level, as proposed in TaWD, will be a big change for the ADB to make. The following section will explore how such an approach might be best employed by the ADB.

# SYSTEMS THINKING

## How to Encourage Nexus Thinking

Nexus thinking as described in ADB's TaWD document is not evident in ADB projects to date. The following section will analyse what the effect of not incorporating nexus thinking is and then, why some of the trade-offs are being made. It will go on to explore how nexus thinking might be systematically encouraged by the ADB.

TaWD says that a lack of nexus thinking is liable to result in inefficiencies and uninformed decision making. In the case study of the hydropower plant in Indonesia, we see a project underway that has not considered the full impact it could have on affected communities. Nexus thinking, using the example of Orr's 'Hydropower in the Mekong' study, demonstrates that in his case study the increase of the dam's size and subsequently submerged area could impact food security. But the current, narrow focus of the project design of 'Scaling up Hydropower in Indonesia' has not taken this possibility into account, and so the project may have made a trade-off between energy and food sectors without being fully aware they were doing so. This decision is yet to prove destructive or innocuous. Someone has made the decision to make such a trade-off, unaware of a larger range of possibilities of outcomes that could have been illuminated by nexus thinking.

Likewise, ADB's 'Visayas Base Load' project has been made without full consideration of flow on effects of the project to other sectors. Seawater is to be abstracted and used for cooling in the plant before being treated and disposed of, back into the ocean. Often foreign chemicals are released into the marine environment to stop the "biofouling", or corrosion of machinery used to extract or

replace seawater for cooling. These chemicals can have disasterous effects on marine life.[57] Monitoring of the effects of this process have not been considered in the Environmental Impact Assessment (EIA) so far, neither have seasonal changes to the marine environment. Samples were taken in October 2004 and August and November of 2008 (for a period of one hour each time)[58] and so has ignored the possibility of the site having seasonal variations in marine life and the role that could play in food supply to nearby communities and ecosystems. A standard EIA would have made inter-seasonal observations regardless of a nexus approach. A nexus informed EIA would have made inter-seasonal observations to learn of possible disruptions to ecosystems, ecosystem services and the role of any local flora or fauna in aquaculture. Disruptions to these systems could steal away any social licence ADB may currently hold. This project has suffered from a lack of nexus thinking and also an insufficient EIA; it is possible that these two factors are related. The lack of nexus thinking here, has meant the project could be harmful to ecosystems and communities, but that these dangers were not factored in to project planning or operation.

ADB has done little to incorporate nexus thinking into its projects and those are but two brief examples. ADB's potential employment of nexus thinking has been spoken about widely, including in the release of the TaWD document, in the Water Operational Plan, by the ADB President at various events[59], and 2014 updates of Food, Water and Energy Outlook publications. Despite the discussion within ADB of incorporating it, there is little evidence of it being used in projects to date. It may be premature to expect evidence of such an approach so soon, but looking for evidence of it at this stage not only helps us understand how ADB projects will need to change to incorporate it, but we find the dangers that will continue to develop if they fail to incorporate nexus thinking. There is a growing body of literature to support the use of nexus thinking and there remains plenty of room for ADB to be more engaged with this literature.

TaWD predicts that a number of benefits could be observed in both project outcomes and outcomes for Developing Member Countries (DMCs) if nexus thinking *was* incorporated in projects. TaWD argues that these benefits would include avoiding shortages in supply from constraining economic growth. Nexus thinking could encourage a change in current management trends; price signals could develop to reflect scarcity of resources providing important institutionalised management techniques. More efficient use of water and energy would allow savings to be passed on to both public and private consumers, lifting more people out of poverty. Nexus thinking would incentivise long term investment in food, water, energy sectors, shifting current patterns of investment which ADB argues are short sighted.[60] The result of all of these improvements that ADB are aiming for, would be to increase efficiency in resource use to ultimately provide food, water, energy services to more people.

The literature mentions similar benefits of incorporating nexus thinking but is more hopeful (or perhaps less conservative) in its projections. Scott et al. suggest that managing food, water energy "in tandem offers potential for global change adaptation"[61]. Bazilian et al. argue that benefits could

[57] S.W.Y. Ma*, C.S.W. Kueh*, G.W.L. Chiu*, S.R. Wild*, J.Y. ip** 1998, Environmental management of coastal cooling water discharges in Hong Kong, Water Science and Technology, Volume 38, Issues 8–9, 1998, Pages 267–274, http://www.sciencedirect.com/science/article/pii/S027312239800701X

[58] Korea Electric Power Corporation (KEPCO)–SPC Power Corporation (KSPC), 2009, Environmental Assessment Report- Philippines: Visayas Base Load Power Project. Table 1, p. 10.

[59] Takehiko Nakao, 2014, Keynote Address at the 14th Delhi Sustainable Development Summit http://www.adb.org/news/speeches/keynote-address-14th-delhi-sustainable-development-summit and http://www.adb.org/news/think-differently-asias-water-food-and-energy-security-adb-president

[60] ADB, 2013, TaWD, p.vii

[61] Scott, C. A., Pierce, S. A., Pasqualetti, M. J., Jones, A. L., Montz, B. E., & Hoover, J. H. (2011). Policy and institutional dimensions of the water–energy nexus. *Energy Policy*, 39(10), 6622-6630.

include "economic efficiency, resource efficiency, improved livelihood options and public health."[62] Others suggest that strengthened coordination between sectors could result in broad environmental benefits including an improvement in ecosystem services. [63] These suggested benefits are discussed with a critical view, too. Closely following many of these discussions of potential benefits is one of difficulties in implementing nexus thinking.

The literature and ADB have some predictions in common, such as the concept that if nexus thinking was incorporated in project design, there would be fewer unknowns. The project would not be such a risk, and this could improve opportunities for investment. If there is a need to make trade-offs, it is best to make them with as much information as possible, and nexus thinking facilitates that. Although neither the literature, nor ADB explicate it as a subsequent benefit, presumably such decision making reduces risks, and allows for negative externalities to be mitigated thereby decreasing the risk to possible investors. More informed decision making is an important end in itself, but as far as both ADB and the literature conceptualise it, it may also increase possibilities for much needed investment in the food, water, energy sectors. If and when ADB do decide to make serious efforts to incorporate nexus thinking, a number of suggestions emerge both from the literature and from this analysis as to how might they do so.

The United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) suggest a number of specific ways in which nexus thinking might be encouraged. Their suggestions fit into three broad categories of: sector based approaches, governance, and others along the science/policy interface.[64] Sector based approaches include: conceptualising waste as a resource, cooperation with and between the international donor communities, improved learning from transnational river basins, increased uptake of new technology and improved data collection. These sector based methods to take up nexus thinking are underpinned by and could be encouraged or discouraged by governance and policy. Governance measures to encourage nexus thinking could include: improved negotiation of sovereign agendas, facilitating creation of publically accessible databases, adequate enforcement of relevant legislation, and introducing (some, or better) price signals on scarce resources.

Both governance and sector approaches to encouraging nexus thinking would be ideally supported by meaningful engagement with science and academia. This engagement could include: creation of information databases, increased communication between academia and government/industry policy makers and facilitating or contributing to the uptake of new technologies.[65] ADB has the potential to play a role in these measures despite being neither specifically industry, government, nor academia. Given a lack of their own explicit descriptions of how they intend on incorporating nexus thinking, these suggestions provide a starting point for ADB to consider how they can encourage a nexus approach in their own operations. Although for any attempts to include nexus approaches to be consistently implemented, it will require incorporation into ADB policy.

In addition to some of the measures suggested by UNESCAP there are other possibilities for ADB to encourage nexus thinking in its projects. One of these ways is by adding an additional safeguard. Currently safeguards aim to

[62] Bazilian, M., Rogner, H., Howells, M., Hermann, S., Arent, D., Gielen, D., & Yumkella, K. K. (2011). Considering the energy, water and food nexus: Towards an integrated modelling approach. *Energy Policy*, 39(12), 7896-7906.

[63] Rasul, G. (2014). Food, water, and energy security in South Asia: A nexus perspective from the Hindu Kush Himalayan region. *Environmental Science & Policy*, 39, 35-48.

[64] UNESCAP, 2013, Water, Food and Energy nexus in Asia and the Pacific. Bangkok, Thailand. P. 47.

[65] UNESCAP, 2013, Water, Food and Energy nexus in Asia and the Pacific. Bangkok, Thailand.

(i) "avoid adverse impacts of projects on the environment and affected people, where possible;

(ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is impossible; and

(iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks."[66]

Safeguards are compulsory evaluations of potential impacts of projects; current safeguards include: affected environments, need to resettle people and involvement of indigenous peoples. ADB's suggested inclusion of nexus thinking supports all of these points above and so it initially appears as if it may make an effective safeguard and neatly fit into the safeguard policy. Practically, of course, it may be difficult to include nexus approaches as a safeguard; the value of the nexus approach lies in its ability to explore complexity. Such messy concepts are not readily transferable to an exercise which requires a graded and "yes or no" answer, as current safeguards require. The benefits of including an evaluation of nexus thinking at the safeguards check point is that it would be required of each project without exception. One possible downside is that a nexus approach could be simplified beyond recognition, allowing projects to say it has been included, yet not guaranteeing any sophisticated engagement with the concept. Putting a requirement for nexus thinking into safeguards would not ensure any meaningful engagement with the concept, and as we've seen with ADB's Energy Policy, inclusion of a concept in a policy does not guarantee meaningful engagement. Requirements to include nexus thinking need to be incorporated much earlier in the project design phase, and to do this it needs to be deeply understood and valued at multiple levels within ADB.

Current ADB policies including the Energy Policy 2009, and the Water Operational Plan 2011 and various Country Strategies need to be reworked to include provisions to incorporate nexus thinking in the project planning stages. Inclusion in these policies is valuable in itself, but as we've seen with renewable energy, inclusion in policies does not translate to immediate uptake in projects. As each project is designed to fit carefully within a number of policies, incorporation of nexus approaches into policies would be another way to ensure it contributes to each project. If the ADB is serious about such a cross sectorial approach, it needs to be included at two levels within each of the policies mentioned. It needs to be mandated on a broad theoretical and policy level, and it needs to be mandated that each programme include such thinking at the project planning, research and scoping stages.

Such thinking could also be made publically available to encourage awareness of nexus issues and trade-offs. For example, in each of the Project Data Sheets, (a brief, publically available summary written about each ADB project undertaken) there is a compulsory section which asks "Project Rationale and Linkage to Country/Regional Strategy", perhaps there could be a similar requirement asking "exploration of nexus issues" requiring a brief discussion. Benefits to such a requirement could be contributing to a public and academic conversation on nexus issues and allowing ADB to be more transparent. Obvious downsides to making such information publically available include public backlash to choices and trade-offs being made.

There are a number of ways ADB could ensure that nexus thinking is applied to its projects. Which, if any of these are taken up will depend on a number of things including internal politics and the extent to which ADB decide it is necessary to do so.

Nexus thinking as described in the TaWD document is as yet, lacking from ADB projects. Despite cross over between the energy sector and the food or water sectors, this is not acknowledged nor

[66] ADB, 2013, OPERATIONS MANUAL- BANK POLICIES (BP), Safeguard Policy Statement

factored in to ADB projects. The effect of this is that trade-offs are made, but not acknowledged, and the flow on effects from these trade-offs are not measured, so losses and disadvantages from not including nexus thinking cannot be measured. There are a number of ways in which ADB can incorporate nexus thinking into its policy and practice to achieve increased efficiency, sustainable resource management and prevent unnecessary trade-offs.

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