Towards a World Bank Group Policy on the Social and Environmental Impacts of Dams, Reservoirs and Hydroelectricity Projects

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Robert Goodland, Randy Hayes, and Brent Blackwelder
Comments welcomed by: Rbtgoodland@gmail.com, RHayes@FDNearth.org, brentblackwelder@yahoo.com.

"If we don't confront climate change, we won't end poverty. ….The only way to avoid this is to break the business-as-usual pattern of production and consumption."
World Bank President Jim Yong Kim, June 2013.

Rationale

This paper offers the case that mega dams as proposed by the World Bank are not the answer to the Bank's stated priorities, namely reducing poverty and preventing climate change. The paper also offers ways the World Bank could vastly reduce the impacts of energy- and hydro-development while reducing poverty and climate risks.

The world has changed fast over the last decade; the development community needs to keep revising its goals and policies. Lessons can be learned from "too big to fail" bank and development project scandals. Leadership needs to emerge for pro-poor, smaller scale decentralized economic development and economies that are more regionally self-reliant. The World Bank Group needs to shift its leadership accordingly. Commitments toward climate resilient agriculture, regenerative cities, energy for all, and the elimination of subsidies are welcome parts of the leadership shift.

The World Bank Group (WBG) commendably now states that its prime objectives have recently become accelerating poverty reduction and reversing climate change. Poverty reduction means *inter alia* ensuring affordable food for the poor. Ensuring affordable food or the capacities and opportunities to feed families, should be a top priority for the WBG. However, climate change has already jeopardized food supplies and is fast undermining agricultural productivity; this trend is expected to intensify. The WBG must confront the two countervailing forces: that of reversing climate change through increasing absorption of Greenhouse Gas (GHG) by forests or photosynthesis in general together with halting carbon- and eventually fossil fuel-based projects, versus that of alleviating poverty and increasing food production by converting yet more forest to agriculture.

Poverty reduction includes not creating new poverty as involuntary resettlement can. The world now needs more intact habitat for carbon sequestration capacity, not just 'no

net loss'. Biodiversity loss must be halted fast because it is irreversible. In general, hydroelectric development projects (hydros) increase poverty of the impacted people, especially the poorest, while reduce biodiversity and riverine services, emitting GHG such as methane (Fearnside, 2012) and decreasing GHG sequestration. This Hydro Policy[i] is designed to prevent those retrogressive results.

As should be well known, different hydro project sites vary tremendously in their potential for negative social and environmental impacts; there are low impact dams (e.g., Box 1) and high impact dams (e.g., Box 2). The Bank's challenge is to become able to distinguish between good and bad dams (Ledec & Quintero, 2003). The purpose of this policy is to eliminate the five biggest consequences of hydro development, namely forcible resettlement, deforestation, aquatic and riverine degradation, biodiversity loss, and production of GHG, so that low impact hydros go ahead, while demoting high impact hydros, in a shift to lower impact solutions. All energy options impose impacts; there is no free lunch. The aim is to choose the least bad or lowest impact option.

Box 1: A Low Impact Dam: Chile's Pehuenche Hydro Example

Low impact large dams are indeed rare and are still not perfect. The lowest impact type of dam that this policy aims at promoting is Southern Chile's 570 MW Pehuenche Hydro on the Maule/Melado rivers. This dam qualifies as low impact, as there was no displacement of humans, no biodiversity loss and no GHG emissions. The challenge for the WBG is to replicate Pehuence Hydro's low impact features. It was supported by a US $95m IBRD loan approved 1987.

The most effective way to ensure low environmental and social impacts is site selection. Formerly, this was determined more by maximization of power output, but nowadays environment and social concerns are being internalized so have risen in importance to match other technical criteria. The paramount beneficial features of this project include its small (200-400 ha. x 90m-high dam) reservoir, high (c.2000 m.) in the Andes mountains, with no forest and little vegetation (near the snow zone). It is the highest impoundment on this tributary. There is zero resettlement as the area is uninhabited. No fishing has been seen in the project area, partly because the area is high in altitude, unpopulated and distant from villages. In addition, the river is already impounded downstream. This project was identified by a thorough sectoral expansion study based on least-cost ranking, last updated in 1986. IBRD has cooperated with Chile's power sector since 1948 and has had decades of commendable experience with Endesa.[ii]

The main environmental impact was that the reservoir would flood two of Chile's twelve cliff-breeding colonies of the Chilean Conure or Burrowing Parrot (*Cyanoliseus patagonus byroni*) which breed in 1-2m-deep holes it excavates in sandstone cliffs. This Chilean Parrot was threatened with extinction from domestication and the shooting of adults accused of damaging maize and wheat crops. The hydro project financed a $1.1 m program including conservation of the other ten breeding colonies nearby, relocated parrots from the two threatened sites, while ramping up captive breeding and reintroduction. This helped stabilize the population.

A major reason for the WB getting involved in this low impact Pehuenche Project, was that the Project Officer, an engineer who had long and valuable experience with hydro projects throughout Latin America, was unusually receptive to the social and environmental concerns and presented to the WB a convincing case for Bank financing. His Endesa counterpart championed impact reduction and was supported by a Bank enviro.

The audience for this note is WBG and other development officials, hydro designers, environmentalists and especially civil society seeking to improve economic development and conserve our environment. Above all, this policy is designed to provide those threatened with impacts on themselves and on their livelihood with the means to prevent damage.

Environmental and Social Priorities

The four topmost environmental and social priorities[iii] to be addressed before financing new large hydros have now become:

1. **Transparency and meaningful participation**: from the earliest stages of dam design are essential. The United Nations Declaration on Indigenous Peoples (UNDRIP) and especially Free, Prior and Informed Consent (FPIC) must prevail for all people likely to be impacted in all development projects. Consent means the people voluntarily agree to move because the compensation, inducements etc are guaranteed to ensure they become promptly better off. Eminent domain should be used as a last resort to expropriate in a few special cases with full due process. For example, where the landowner or user cannot be traced or has died or is too infirm.

2. **Performance bonds and industrial insurance** must be required to guarantee poverty is not increased by the development project. If insurers calculate the risks of a hydro project are uninsurable, the project should be redesigned or shelved. Human rights must be fully respected, women become better off and conflict zones avoided. Where there are human rights violations and lack of transparency and participation, the WBG should not invest.[iv] There should be no more use of force in economic development, and no more involuntary resettlement.

3. **Poverty reduction**: is more important than provision of electricity to major industries, mines, smelters etc. Development finance is scarce for poverty reduction, while the more commercially motivated hydro attracts abundant private sector finance. Hence, provision of electricity for poor and communities to reduce energy poverty should take precedence over mega hydro for mines. Urban and rural electricity supply should take precedence over supply to industry. Small off-grid projects help rural and isolated communities. If the project cannot guarantee that those displaced or otherwise harmed will be promptly somewhat better off after the project or after their move, FPIC is unlikely to be reached and the proponent should redesign or drop the project.

4. **No more flooding or harm to forests**: or to other terrestrial and aquatic habitats (not just critical natural habitat) by the reservoir and especially downstream in order to: (a) preserve means of sustenance for human livelihood dependence (no more dispossession even if there is no displacement; no net damage to fisheries etc.); (b) maintain and boost carbon sequestration, and (c) prevent GHG emissions and loss of biodiversity.[v] The water catchment should be conserved as a matter of routine in order to conserve water supply to the hydro, conserve biodiversity and sequester GHG. If the WBG makes the irrefutable case that it has to destroy forest or biodiversity or reduce GHG sequestration capacity, then to conserve livelihoods and biodiversity, it must finance as a prior condition before any construction the perpetual conservation of a significantly larger biologically similar tract elsewhere while fully respecting the rights and livelihoods of any people depending on the site selected for the offset. IFC's Performance Standard 6 is a commendable start in this regard. To ensure no net GHG emissions, the Bank should conserve intact habitat first, reforest with native species, or otherwise or revegetate an adequate multiple of the carbon sink to be lost (minimally a 3:1 ratio). This should apply to all projects, not just hydro.

5. **Estimate Greenhouse Gas Emissions:** Calculate GHG to be emitted or absorbed by each proposed project, (i.e., carbon accounting; e.g., Liden, 2013). Halt GHG emissions; augment GHG sequestration; promptly phase out subsidies favoring fossil fuels and agricultural biofuels; internalize external costs.[vi] This applies to all GHG emissions including from the reservoir and from deforestation. If the WBG makes the irrefutable case that some GHG emissions are unavoidable, then it should augment GHG sequestration elsewhere to more than offset by an adequate multiple the GHG emissions expected from the project. The WBG in any event should use its convening power to foster support for putting a price on GHG and for a GHG pollution emissions tax.[iv] In addition the WBG should promote climate resilience. A portfolio of decentralized, diverse, adaptive water and energy options will strengthen climate resilience, whereas concentrating investment on centralized large reservoirs, particularly in countries that are already highly hydro-dependent, will increase vulnerability. This, again, is the leadership shift to appropriate scale lending. Promoting regional self-reliance promotes resilience. The UN's *"Sustainable Energy For All"* initiative, invigorated by Secretary-General Ban Ki-moon, puts it correctly in stating the aim is to connect 1.3 billion people to electricity by 2030, while doubling the contribution of sustainable sources of energy to world supplies (cf: IEA, 2011). This laudable goal would be undercut by mega hydro because it is less likely to connect urban and rural communities as it runs at such high voltages (e.g., 500 kV) that are very expensive to step down to voltages useable by communities (e.g., AC's of 230 V – 415 V).

The Means to Achieve the Priorities

The means to achieve the four priorities above would be to adopt the following as mandatory WBG policies:

a. Closely follow best practice as set out by the WBG-financed World Commission on Dams (WCD, 2000). Comprehensive water management is one example.[vii] The new President of the World Bank Group seems to have forgotten the sensible recommendations of the World Commission on Dams.

b. Promote energy efficiency and energy conservation to the fullest extent possible. Tighten up on demand side management before financing any new capacity. Retrofitting, rehab and upgrade existing hydro before new capacity.

c. Always use "Least-Cost Ranking" that includes internalizing ecological externalities to achieve a much more true cost picture of the project. Incorporate transparency and meaningful participation of all stakeholders.

d. Promote low impact renewables (e.g., wind, solar, wave, ocean currents), before high impact extensive storage reservoirs in forest. All low impact renewables also must be prudently sited and be guaranteed to be low impact. Promote pumped storage into low impact sites such as empty mines, before big storage reservoirs. A few fully run-of-river (R-o-R) hydros (meaning little or no storage) and mini-hydro[viii] are sometimes preferable to big storage reservoirs, but not many R-o-R hydros on the same river.[ix]

e. Options assessment, such as off grid and smaller projects for communities, should be carefully considered during earliest planning stages so that big new hydro becomes the last resort.[x] Weight low- or no-head hydro if they are the lowest impact, before high-head mega hydro.

f. Provision of electricity for urban and rural communities and the poor from a proposed project must exceed the amount allocated to industrial users, because power for communities can directly reduce poverty, whereas supply to mines and smelters imposes the biggest impacts with very inefficient trickle-down benefits for non-industrial users. A modest fraction of the hydros profits should be allocated to the oustees, the poor and communities. The WBG should lead on fostering consensus on how this is best achieved.

Box 2: Replicating Dam Fiascoes: Democratic Republic of Congo's Inga projects [xi]

The World Bank announced its support for mega hydro dams by selecting as its text-book showcase example the outdated top-down $80 bn. 40,000 MW Grand Inga Hydroproject on the mainstem Congo River, which would be the biggest in the world, far surpassing China's 25,000 MW Three Gorges hydro. Nearly all Grand Inga's power will be exported. In 2009, the Bank granted $50 million to cover Grand Inga's technical studies. It reaffirmed its support for Grand Inga in 2012 and 2013. Construction the lower impact Inga 3 is planned to begin in 2016, as a stepping stone towards the biggest impact Grand Inga. This is listed by the G20-Multilateral Development Banks as one of the top 10 "Exemplary Transformational Projects.

However, the WB's handling of Inga 1 and 2 dam projects raises fundamental concerns. The 351 MW Inga 1 Dam was completed in 1972 and the 1424 MW Inga 2 Dam was finished in 1982. By 2002 these dams were producing at only 40% capacity. Many of the turbines don't work because of lack of maintenance. Six communities in the '60s and '70s were forcibly resettled to make way for the first two Inga dams. These communities have been declared illegal and still await compensation. Inga's 1725-kilometer long transmission line to Katanga's copper belt for the project was the biggest single contributor to the DRC's debt problem in the 1990s. Actual construction costs for the transmission line quadrupled from initial projections to reach $1 billion. This high voltage transmission line was designed to serve distant copper mines and smelters, but not for cities and villages en route. DRC certainly needs more electricity: Less than 10% of DRC's people have electricity right now. The question becomes: will the trickle-down from exporting electricity actually reduce poverty or provide power to DRC's people?

In view of the unacceptable performance of the project, the WB lent $200 million for dam rehabilitation, to be completed by 2007. The construction was so far behind schedule in 2007 that the WB lent another $297 million and convinced the African Development Bank and European Investment Bank to put in an additional $200 million. By 2011 everything had deteriorated further, so the WB provided yet another rehabilitation loan for $283 million. The target date for completion was set at 2016 but by November 2012, a Bank review found progress "moderately unsatisfactory." Today the transmission line is at only 25% capacity so the WB has provided a $560 million rectifying loan. In summary, the rehabilitation plan's costs have soared to $1.2 billion over 10 years where the work is nowhere close to being done. The 150m-tall Inga 3, the first stage Grand Inga's six stages, will divert water into the Bundi Valley, starting with a canal and eventually flooding the valley as the stages proceed. Retention time has not been divulged. Bundi valley's communities and farms will be displaced by the c.220 Km^2 reservoir. Inga 3 begins in 2015. The next stage, Inga 3 High-Head, will add an additional 3,000 MW and includes construction of the Grand Inga Dam.

"Large hydro is a very big part of the solution for Africa ... I fundamentally believe we have to be involved," said Rachel Kyte, in May 2013, the bank's vice-president for sustainable development. This contradicts the International Energy Agency (IEA), which found that because of the continent's low population density, grid-based electrification – including through large hydropower projects – is not cost-effective for much of rural Sub-Saharan Africa. According to the IEA report, 70% of the world's unelectrified rural areas are best served through mini-grids or off-grid solutions. IFC's "Lighting Africa" is a good start, almost the opposite of Grand Inga.

In May 2013, WBG President Kim visited the DRC with UN Secretary General Ban Ki Moon to boost Grand Inga by announcing a further $1 billion *inter alia* to promote big hydro. In July 2013, the Bank pledged another $50 million for technical assistance to accelerate Inga. The Congo River's 4 m Km^2 drainage basin rains tons of leaves and other organic matter into the watercourses. Fed by the vast Congo forest, Grand Inga would emit volumes of GHG depending on reservoir retention time and would harm biodiversity, including fish and their migrations. The 2735 or 3600-Km-long 500 kV DC $3-$4 Bn. power transmission line via Botswana, Angola and Namibia to Witkop/Zeerust in South Africa alone would have major impacts and substantial power losses. As most communities use 11KV or 33KV, a DC line virtually guarantees local people will be excluded from any power at all. Displacement of people has not yet been estimated. DRC's corruption index is 160th out of 178 nations, according to Transparency International, so corruption, political instability and civil war make Grand Inga highly risky. How does Inga compare with the low impact dam, Chile's Pehuenche in Box 1?

g. Optimize the potential of hydrokinetic turbines or non-dam hydro. Select engineering (e.g., by kinetic turbines, which do not require any head of water as they are powered by the flow of water) to reduce the size of the reservoir area.[xii] Harness kinetic energy by means of axial tube turbines sitting on the riverbed. The shorter the retention time, the better the water quality. The WBG can achieve its goals of poverty and climate risk reduction by preferentially supporting least impact hydro technology of the future (little or no dams and reservoirs) leaving conventional high-head mega hydro to the industry desiring it.

h. Strengthen capacity to ensure good implementation and independent monitoring, including independent outside guidance (such as Panels of Experts and Citizens' Advisory Councils[xiii]) from the earliest planning stages in order to ensure best practice ESIA, including cumulative impacts.

Box 3: Precautionary Energy Production & Quid Pro Quo Replacement

The precautionary approach is essential given that the consequences of climate disruption are potentially cataclysmic and disproportionally hurt the poor. This is already being experienced with agriculture in Africa and elsewhere. Atmospheric carbon dioxide concentration hovers around 400 ppm[xiv], a level not seen in more than 3 million years. The world must get back below 350 ppm GHGs in time to ensure a livable planet and prevent runaway climate disruption. This requires (a) halting the increase in GHG emissions worldwide, (b) broad-scale increase in GHG sequestration by reforestation, and (c) vigorous global energy efficiency and renewable energy campaigns.

In sub-Saharan Africa an estimated 585 million people lack access to electricity. Decentralized renewable energy projects have the flexibility to deliver energy without expensive transmission lines. The International Energy Agency reports that 70% of the world's un-electrified rural areas are best served by mini-grids or off-grid solutions. The following five policies help position the World Bank as a leader in the societal U-turn to a more ecologically sustainable energy future. The cornerstone of this approach is the principle of "first do no harm", and unlike the big centralized power plant approach has the ability to alleviate poverty.

a. In order to provide electricity to those lacking access, the World Bank policy is to fund only decentralized renewable energy production only (e.g., small low impact hydro, wind, solar, biogas) so as to bring electricity to those currently lacking access to electricity.

b. No large hydro [nothing over 10 megawatts or 10 meters in height) or fossil fuel plants will be approved or funded for existing grid or new delivery.

c. When countries still deploying dirty GHG emitting plants, request assistance to meet energy growth demands, the World Bank will only fund energy efficiency and energy conservation projects to help meet people's needs.

d. Additionally, when countries, still deploying dirty GHG emitting plants request assistance to reduce these emissions, assistance will be provided for clean energy plants to replace the mega-wattage of fossil fuel plants they wish to eliminate.

e. When clean energy meets current needs and those seeking access to energy are getting help, new energy efficiency and energy conservation measures and new renewable energy plants (beyond current capacity) may be considered.

Summary of Main Conditions for Financing Hydro Projects

The major new conditions in this document seeking to prevent imprudent high impact hydros include:

Transparency, Participation and Consent: Displacement must be zero or small, totally voluntary and follow UN's FPIC. The people involved must voluntarily be willing to move because the compensation is such that they see that they will be clearly better off promptly after their move. There must be no forcible takeover of resources. No project should be imposed. The imposition of projects promotes criminalization and assassination of those who oppose dams. FPIC must be also for lands, ecosystems and other resources proposed to be taken by the project, even where there is no physical resettlement. No involuntary resettlement, including downstream riparians.

Poverty Reduction Priority: No deprivation from any basic need, not only monetary. Profits generated should be shared with the impacted people for development. Impacted communities must be project creditors or beneficiaries that should be guaranteed a source of payment from the proceeds of the project. No increase in poverty. Performance bonds or insurance with independent oversight should guarantee this.

Climate & Forest Friendly Options: No net increase in GHG emissions: Any GHG emissions must be more than fully offset[xv] by reforestation well in advance of the start of construction.

Adopt "No-Go" Zones: A list of areas off limits to hydro financing such that there will be no net loss of biodiversity, forests or other ecosystems: any expected loss must be offset by conservation of a larger similar unused tract in perpetuity. There should be a No Go for some rivers, as provided for in the 1968 US National Wild and Scenic Rivers Act. If valuable cultural patrimony, such as sacred sites, are not salvageable, they should also be on No-Go lists

True Cost Representation of Project Options: Internalization of all external social and environmental costs: to be used in the least-cost sequencing (and cost-benefit calculations) of power projects.[xvi]

Legacy Issues: Gross violations of human rights or other damages by a WBG-financed project, such as massacres of impacted people (See Box 4 and Endnote IV) or rupture of a mine-waste lagoon, should be rectified by indemnification, reparations, or compensation to the complete satisfaction of the sufferers or their descendants, before the next similar project is permitted. Community development and ecosystem repair are ways of helping people and their ecosystem livelihoods harmed by previous WBG-assisted hydros; this would boost WBG effectiveness. An independent audit mechanism should be established.

Box 4: Hydros, human rights abuse, and the right to remedy: Guatemala's Chixoy Dam

[Source: IAHRC 2012, Johnston 2013, 2012a,b, 2011, 2010, Johnston et al.2012, US Senate, 2013]

Financing for Guatemala's Chixoy Dam was twice provided by the World Bank (in 1978 and 1985) with loan agreements that required the Government of Guatemala to provide proof of legal title to development project land and obligated the Bank to insure legal title before disseminating funds. Full title was never acquired and loans were disbursed in violation of contractual obligations. In 1997, World Bank financing and technical advice produced a privatization plan for the electrical sector that with the sale of energy distribution and most electrical generation facilities allowed the repayment in full of outstanding World Bank energy-sector loans. (Johnston et al, 2005). More than 440 Maya Achi Indigenous Peoples 'in the way of the dam' were massacred in 1982.

Documentation of these and other development-related problems led to civil protests in 2004 when indigenous communities occupied the dam site (still legally titled as communal lands). The protest was peacefully resolved with the Government agreement to establish a reparation negotiation process. Meetings commenced in 2006, a process involving dam-affected communities, the Government of Guatemala, facilitators from the Organization of American States InterAmerican Human Rights Commission, and representatives of the World Bank and InterAmerican Development Bank. The negotiation process included a review of the evidentiary record and the generation of a statement of damages signed by all parties, including representatives of the WBG and IDB, In 2010, a multi-million dollar reparations plan to remedy the many injuries acknowledged in the statement of damaged was finalized and signed by all parties; terms included development assistance, social and cultural support, and environmental restoration of the river basin.

The record of massacre, forced disappearances, and other human rights violations that accompanied the development of Guatemala's Chixoy dam was also addressed in the Inter-American Human Rights Court case of Rio Negro massacres v. the Government of Guatemala (2012), where hydroelectric development of the Chixoy river basin is specifically mentioned as the background event that led to the Rio Negro massacres. It is also recognized as an inhibiting factor to achieving full reparation. Members of the Rio Negro community cannot perform their funeral rituals because some disappeared villagers have yet to be identified; construction of the dam and its reservoir has destroyed indigenous sacred sites; and, inundation physically and permanently hinders the return of the Rio Negro communities to their ancestral lands. The Court also found that living conditions in the resettlement community have not allowed the inhabitants to resume their traditional economic activities; basic health, education, electricity and water needs have not been fully met; and these conditions have caused the disintegration of the social structure and cultural and spiritual life of the community. Observing that the massacres of the community of Río Negro took place within a systematic context of grave and massive human rights violations, the Court found that in addition to historical damages "the surviving victims of the Río Negro massacres experience deep suffering and pain… which fell within a state policy of "scorched earth" intended to fully destroy the community". (IAHRC, 2012).

As of this writing (September, 2013), the Government of Guatemala has taken no action to implement the InterAmerican Human Rights Court order for reparation in the Rio Negro massacre case, nor has it implemented the 2010 Chixoy Dam reparations agreement. This impasse has prompted language in the United States Senate 2014 Foreign Operations Appropriations Bill requiring the international banks who financed the Chixoy Dam to return all profit from their investment (interest and fees received) and demonstrate institutional compliance with accountability mechanisms providing "just compensation or other appropriate redress to individuals and communities that suffer violations of human rights, including forced displacement, resulting from any loan, grant, strategy, or policy of such institution." The Senate Bill also directs the Secretary of the Treasury to "instruct the United States executive director of each international financial institution to seek to ensure that each such institution responds to the findings and recommendations of its accountability mechanisms by providing just compensation or other appropriate redress to individuals and communities that suffer violations of human rights, including forced displacement, resulting from any loan, grant, strategy or policy of such institution." (United States Senate 2014, S.1372)

In August 2013, World Bank and InterAmerican Development Bank representatives traveled to some of the Chixoy dam-affected communities, announcing their intent to provide technical assistance and basic infrastructure projects through the Presidential Planning Secretariat. Following these Bank presentations communities rejected the notion that such assistance constituted reparation, and reconfirmed their demand that the Government, and the Banks, adhere to the full set of terms contained in the OAS-negotiated reparations agreement.

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Endnotes:

[i] Hydros are dimensioned using the most information possible on historic precipitation, flow data and weather in the watershed. The WBG used to get it right: the 2011 World Bank report recognized that "long-lifespan infrastructure, such as hydropower plants, is generally less adaptable to changes whereas short-lifespan infrastructure can be replaced in the long term as the climate changes." The report warned that "heavy reliance on hydropower creates significant vulnerability to climate change." Long time series historic weather data used to be a reliable guide to future weather. Climate change has made historic weather data a poor and unreliable guide to future weather patterns. Rains and storms will become more intense, but may be reduced in overall amount. Floods may intensify. Tornadoes, hurricanes and cyclones may become stronger or more frequent. Longer lasting and more frequent droughts will occur. Heat waves will become fiercer and more frequent. Blackouts and brownouts will intensify. Evapotranspiration is likely to soar. Wildfires will increase. Well above average rainfall may alternate with well below average rain. The International Energy Agency reports (July 2013) that global temperatures could rise a startling 9°F by 2100, which would be disastrous for all nations. The WBG's June 2013 climate report ("*Turn down the Heat*") warns of dire consequences for a warming planet. The June 2013 report of the U.S. Center for Naval Analyses and the Royal United Services Institute recommends more effort into preventing and fighting global warming than securing supplies of oil.

[ii] This was IBRD's last loan to Endesa because it was privatized soon thereafter. That was in 1992 when IFC moved into the hydro sector, with no experience, causing the World Bank Group's massive fiasco with their financing of the Bio Bio Pangue and a cascade of five more dams upstream. This still is being fought by the impacted Pehuenche/Mapuche Indigenous Peoples. Several mandatory policies were violated by this financing. The lesson here is to shift to more decentralized smaller scale projects.

[iii] This document outlines environmental and social aspects of hydro projects. We leave the overdue revamping of economic policies for hydro selection to others, especially least-cost sequencing of energy options. The main economic advice in this document includes: (a) removal of carbon-rich and fossil fuel subsidies, (b) internalization of environmental and social costs (e.g., GHG emissions, voluntary resettlement to guarantee improved livelihoods for oustees and downstream river users, GHG absorption offsets, biodiversity offsets) into cost/benefit analyses for project selection, (c) using a price for GHG emissions and fostering a GHG emissions tax. Dam proponents need to clarify who actually will benefit from new hydro projects, and how such will be guaranteed

[iv] The number of humans evicted or impoverished by dams is unknown (Scudder, 2012). WCD (2000) estimated 40-80 million people were forcibly displaced between 1945 and 2000. At least 60 million people in India were evicted to make way for water development projects. As many as 60 million may have been historically displaced by hydrodevelopment in China. Richter (2010) *fide* Johnston (2013) estimates dams have disrupted natural ecological processes thus impoverishing a conservatively estimated 472 million river-dependent people living downstream. As the WBG's own detailed studies prove (Cernea & McDowell, 2000) that most of the big dams it has financed actually increased the poverty of humans forcibly evicted, the questions arises of reparations. Compensation, repair, restitution and indemnity should be in order in such cases. This would be a strong, dynamic and positive incentive for the WBG not

to finance impoverishing resettlement in the future. In view of the OECD, European Commission and UN's "Polluter Pays Principle", it is reasonable that those responsible for such impoverishment should pay to rectify it before being allowed to finance similar new projects. *A fortiori*, should the WBG restitute for the massacres in which it is implicated? (e.g., Guatemala's Chixoy Hydro, Honduras Villanueva, Colombia Wayuu, South Africa's 2012 Marikana). Scudder (2005:227–228) documents other instances where hydrodevelopment served a state-sponsored policy of ethnic cleansing, including Sri Lanka's Accelerated Mahaweli Project; Mali's Manantali Dam on the Senegal River which provided the opportunity for irrigation, the main reason Muritania's government, dominated by white Moor elite evicted the local black people to Senegal who had customary tenure in Mauritania downstream; Pakistan's Tarbela Dam which forcibly displaced 300,000 people; and, in 1960, the 100,000 people displaced by the World Bank-funded Kaptai Dam in Bangladesh, most of those displaced belonged to Chakma and Hajong Indigenous Peoples. Nearly 52,000 of these displaced people crossed over to India where they are still not recognized as refugees by the UNHCR. As the WBG is a specialized agency of the UN, it is it is legally bound or bears responsibility to uphold the principles of the UN Charter, including respect for human rights.

[v] The Consumer Goods Forum (CGF), a group of the world's 400 largest consumer goods companies from 70 countries, are committed to source only deforestation-free commodities in their supply chains and help achieve net-zero deforestation by 2020. Net zero deforestation should be adopted by the WBG for climate and poverty reasons. Tree plantations on abandoned or degraded lands create much employment, especially for the poor, and sequester much GHG. Reforestation and revegetation should be main elements of WBG's poverty and climate targets.

[iv] It now appears from the WBG's June 2013 *Energy Strategy* that the WBG may be back-tracking on its recent splurge of financing big coal projects (for example: South Africa's 18,000 MW Medupi on line by 2014; India's Gujarat's 4,000 MW Mundra by 2013; Botswana's Mmamabula 1,200 MW first stage in advanced planning; Kosovo's 600 MW lignite jointly with EBRD). While it is fervently to be hoped that the WBG will indeed cease financing coal, it has financed so much coal already that the question of GHG mitigation arises. Should the WBG pay indemnity or reparations for the damage its recent coal financing will cause before financing new capacity? Certainly, the WBG should cease financing forest destruction. Instead the WBG should finance GHG emissions offsets to absorb the GHG it has financed. If carbon capture and storage eventually materializes, then the WBG should grant-finance that to be retrofitted.

[v] Putting a price on carbon emissions is a key climate solution. As a modest first step, the WBG should adopt an explicit carbon accounting charge consistent with safe atmospheric limits for carbon loading. Current scientific consensus suggests this exceeds US$50/ton of CO_2. Failing to price carbon emissions is a massive subsidy, estimated at about $800 billion per year globally by the 2013 International Monetary Fund. However, that estimate was based on a carbon damages cost that was recently revised upwards by about 50% by the US government after incorporating updated economic modeling. Using conservative assumptions, global subsidies for the climate costs of carbon emissions now exceed $1.1 trillion per year, and may be much higher. The costs of climate damage are reflected in rising food prices when crops are decimated by extreme weather such as heat waves and droughts, intensified by human-caused climate change. While it is difficult to agree on the true social cost of GHG emissions, e-Journal Economics (2012) calculates it might be $900 a ton in 2010, rising to $1,500 per ton in 2050. The USA uses $43 for 2020, roughly in the center of a range of values. More than ten countries already had a national carbon tax as of mid-2013. However, Bård Harstad's 2012 study: "Buy Coal! A Case for Supply-Side Environmental Policy" shows that nations eager to tackle climate change – including much of the EU – would find it cheaper to pay other nations to keep their fossil fuels in the ground rather than try to cut their own greenhouse gas emissions with measures such as carbon markets or taxes. This is akin to Ecuador's commendable leadership starting in 1997 seeking to leave their Yasuni Biosphere Reserve's 846m or 5bn barrels of oil in the ground untapped. This would prevent emission of c. 1.2 mmt of carbon dioxide. The WBG should lead on thinking through methods of forging consensus to reduce fossil fuel combustion.

[vi] It is alarming that the WBG proposes to follow the weak Hydropower Sustainability Assessment Protocol instead of the more prudent guidelines of the World Commission on Dams financed (but subsequently undermined) by the World Bank (Goodland, 2010).

[ix] Renewable energy is growing fast around the world and will edge out natural gas as the second biggest source of electricity, after coal, by 2016, according to the International Energy Agency (IEA, 2013). IEA also recommends that more than 60% of the funds required to bring about universal access to electricity be invested in distributed renewable energy projects, such as wind, solar and small hydropower plants. (See also: Goodland 2011).

[x] Despite the WBG's recent zeal for mega-hydro, and despite its aversion towards replication worldwide of modest scale, energy efficiency and conservation, they are among the cheapest and fastest ways to help the poor, while reducing GHG emissions growth. Peter Bosshard (2013) persuasively exposes: "Why the World Bank shies away from energy efficiency projects". www.trust.org/profile/?id=003D000001Gq3GoIAJ. To the extent the WBG is serious about poverty reduction and reducing climate risks, it needs stringent policies and persuasive incentives to invest much more in off-grid, small-scale energy systems, combined with efficiency and conservation. As emphasized in (f) above, provision of electricity for communities and the poor from a proposed project must exceed the amount allocated to industrial users.

[xi] Sources include: Braga et al 2004, Coynel et al 2005, Crossland 2006, diPanzu 2005, Hathaway 2008, Heezen 1964, Lustgarden 2009, Mianda Mutonkoley 1987, Morcan 2013, Naidoo 2009, and Showers 2009, 2011.

[xii] Brazil's Santo Antonio hydro on the Rio Madeira sought to reduce flooded area mainly to prevent impacts upstream on Bolivia, by using 44 kinetic (tube) turbines of 71.6 MW each for a rated capacity of 3,510 MW. The tenth turbine entered commercial operation in January 2013. Most of the reservoir lies inside the existing river channel.

[vii] unep.org/civilsociety/Portals/24105/documents/perspectives/environment_papers_discussion_10.pdf.

[xiv] This is for carbon dioxide only. Converting other GHGs (e.g., methane, nitrous oxide, chlorofluorocarbons (CFCs), hydrofluorocarbons. nitrogen trifluoride) into their equivalent amounts of CO_2 that will have the same effect on climate, and add them to the NOAA measurements of 400 ppm CO_2, then the world at 478 ppm of CO_2 equivalents right now.

[xv] Goodland, R. 2012. Responsible Mining: The Key to Profitable Resource Development. *Sustainability 4*(9): 2099-2126. doi: 10.3390/su40x000x. Annex 1: "Offsets".

[xvi] Instead of the current economic default method of assigning zero cost for most environmental and social impacts such as from dislocation, deforestation and GHG emissions, the long-term costs must be reflected in a true cost assessment of the project.