

## HYDROPOWER AND POWER: An Indigenous rights perspective

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*'Human rights are not to be impaired on grounds of national sovereignty or economic interests as these considerations may justify a project but not the nullification of basic human rights'* (Berger, 1994)

- **Introduction**

Examples of political decisions favouring industrial development over minorities' rights and values are common around the world. These proposals are frequently justified as priorities for regional development, undermining the recognition of indigenous rights and excluding them from decisions that affect them directly.

This paper refers to Ralco, a Chilean hydroelectric project built on Mapuche Pehuenche<sup>1</sup> lands in 1997. It also considers similar cases in India and China. Although we must take into account the different contexts in which these situations are immersed, some useful insights can be drawn in relation to Social Impact Assessment (SIA) in cross cultural settings. Moreover, this document reflects on the concepts of public participation, 'national interest' and also on the need for an ethical work from those professionals who work as impact assessors.

In some situations, the regulations in place have been reduced to good intentions that are far from achieving justice, equity and an effective recognition of indigenous rights. It is possible that we might need more or something else to coexist in shared multicultural geographic spaces.

- **Hydroelectricity: advocates and opponents**

There is an important debate over the benefits of hydroelectricity. Some argue that hydropower is a renewable energy and an ideal source of economic growth for developing countries (Yüksel 2010; Kaygusuz 2009; Huang & Yan 2009). However, hydropower is not considered environmentally benevolent by all stakeholders (Wüstenhagen, Markard & Truffer 2003). Environmental effects of hydropower range from elevation of fish methyl mercury concentrations, loss of agricultural lands, shore erosion and sedimentation

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<sup>1</sup> The Pehuenche people differed in the past from the rest of the *Mapuches*. Through time they have become part of *Mapuche* culture and they even share the same language: *Mapudungun*. Their livelihood is based on natural resources, especially on the '*pehuen*' the fruit of the *Araucaria* tree which provide them with flour, milk and alcohol (Aylwin, 2002).

together with unexpected floods and greenhouse gas releases to the atmosphere (Rosenberg, Bodalay & Usher 1995).

Furthermore, social impacts of hydropower projects are mostly related to loss of people's livelihoods due to the -not always recognised- connections between environmental damages and riparian communities' life styles. Transformations of landscapes and ecological modifications (Assani et. al 2005; Hirsch & Wyatt 2004; Arfi 2005) have affected the social well being of indigenous communities and their vulnerable subsistence based economies. Effects on cultural identities, communities stress and psychological impacts have not been sufficiently recognized (Hirsch & Wyatt 2004).

Despite all their adverse impacts dams are still being proposed, approved and built. This situation relates to the fact that profits from this industry benefit host countries, consultants and even governments (Imhof & Lanza 2010).

- **Ralco, Chile**

The Mapuches live in extreme poverty and marginalization especially in the Bío Bío region where the main conflicting hydropower projects have been developed (Skjævestad 2008). Ralco was the second of a series of dams planned in the Bío Bío River by Endesa<sup>2</sup>. The electricity would be transported to central Chile where the principal economic activities are concentrated and where the majority of the population lives (Games 2006). These facts were enough to consider this project as one of 'national interest'.

Pangué was the first dam in this sequence, and its approval was practically straightforward since during that time there was neither a national legal framework for the protection of the environment nor for the protection of indigenous lands. Pangué was completed in 1996 despite the opposition of Mapuche people and environmentalists and did not involve consultation with the affected communities (Aylwin, 2002).

When Ralco hydropower project was presented, environmental frameworks were recently in place and CONAMA<sup>3</sup> had just been created in 1994. The project was developed even though the Environmental Impact Study (EIS) was rejected by twenty government agencies and even though CONADI<sup>4</sup> strongly criticized the project (Aylwin, 2002). CONADI stated that the Pehuenche culture would extinguish within a decade if the construction went ahead and that resettlement and eradication of people from their lands would result in a cultural dead that would not be justifiable by any means of compensation. These statements resulted in the removal of the directors of CONADI from their positions (Orellana, 2004). These social impacts were also documented by the Institute of Indigenous studies of Temuco<sup>5</sup> and were addressed to CONAMA in order to report on the threats that the project represented to the Pehuenche culture.

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<sup>2</sup> It used to be a government's company. Currently it is a consortium of Chilean and European companies.

<sup>3</sup> National Commission on the Environment

<sup>4</sup> National Corporation for Indigenous Development

<sup>5</sup> University of La Frontera, Temuco, Chile.

Moreover, affected people were concerned about the fact that their cemeteries would be flooded and they disapproved the relocation from their traditional lands. They also argued that they were unable to identify similar lands where they would be capable of maintaining their subsistence economy (Aylwin 2002). Some members of the community were subject to cooption and were pressured to accept the lands Endesa offered them. Some people signed documents without knowing how to write or read (Skjævestad 2008). Endesa negotiated individually without considering Pehuenche's collective rights (Aylwin, 2002)

- **Is the State a neutral entity?**

Chile had an Indigenous Law<sup>6</sup> at the moment when Ralco was built. This law recognizes indigenous cultures, communities and lands and creates the CONADI as an entity that holds the responsibility to defend indigenous communities. However, this regulation was ineffective in the protection of indigenous rights regarding Ralco project which resulted in the forced relocation of 'approximately 555 people'<sup>7</sup> and the flooding of their ancestral lands.

Despite the results obtained, social mobilization and awareness among Mapuche people called international attention (Skjævestad 2008). Especially, the *Mapu Domuche Newen*<sup>8</sup> organisation achieved the project to be delayed giving them time to oppose it and to accomplish an important role in the fight for their rights. Similarly, GABB<sup>9</sup> presented a complaint to the World Bank Inspection Panel alleging violations from the International Financement Corporation to the Bank's provisions on matters affecting the environment and indigenous rights (Aylwin 2002).

Towards the end of year 2002, the community presented legal actions against the State of Chile before the Inter-American Human Rights Commission. After a year, a negotiation was achieved through a 'Friendly Settlement'. The State of Chile promised to the Pehuenches a compensation for the injustice they suffered, although '*it is impossible to quantify the harm caused since the beginning of the project*' (UN 2003). They obtained, among other promises, the government's commitment to strengthen laws to guarantee the respect of aboriginal peoples and the promise that no other hydropower development was going to be accepted in the region. In 2003, the Pehuenches agreed to transfer their rights to ancestral lands and to discontinue legal action (Orellana 2004).

Although this negotiation is a relative outcome, it would be important to reflect on these matters. Will the strengthening of indigenous laws guarantee the respect of

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<sup>6</sup> Ley N° 19.253, Ley Indígena, 1993, [http://www.uta.cl/masma/patri\\_edu/PDF/LeyIndigena.PDF](http://www.uta.cl/masma/patri_edu/PDF/LeyIndigena.PDF)

<sup>7</sup> System of Environmental Impact Assessment 'Record of Ralco Hydroelectric Project', [https://www.e-seia.cl/seia-web/ficha/fichaPrincipal.php?modo=ficha&id\\_expediente=56](https://www.e-seia.cl/seia-web/ficha/fichaPrincipal.php?modo=ficha&id_expediente=56)

<sup>8</sup> 'Women with the force of the earth'.

<sup>9</sup> Bío Bío Group of Action.

indigenous rights? Similarly, will the promise of not accepting another hydroelectric project in the region, guarantee the respect of indigenous lands?

In relation to these questions, it is important to consider that the cumulative impacts resulting from the construction and operation of Pangué and Ralco projects were disregarded by the company and by the government. This situation has ignored the fact that this region has not only been subject to hydroelectric developments but also to forestry industries and the proposal of landfills in Mapuche's lands. Processes occurred in the same geographic space have been considered in isolation and dislocated from their 'on ground' reality and the 'Fiendly Settlement' did not recognise this issue.

Thus, Ralco is not surprisingly seen by the Mapuches as a betrayal to the democratic promise that once benefited from indigenous support and that now has forgotten its commitment<sup>10</sup> (Carruthers & Rodríguez, 2009). This has contributed to increasing mistrust and fear since the confidence that once existed has been regularly broken.

It has also been stated that CONADI's participatory methods are limited especially in relation to transferring the inputs from indigenous communities into project's assessments which reveals that indigenous participation is not a priority in the elaboration of reports (Carruthers & Rodríguez, 2009).

- **Could a SIA guarantee the respect of indigenous rights?**

Overly optimistic scenarios are often presented in hydropower projects, where benefits are magnified in relation to negative effects. The 'impartial review'<sup>11</sup> of the Three Gorges Dam is another example of a project that has been accepted by the government and considered as irreversible, even before its assessment. The report considered that the resettlement of approximately 1.1 million people will be a benefit for regional development (Fearnside 1994). However, if we consider that people affected did not participate in the relocation policy-making (Heming & Rees 2000), how could impact assessors know that resettlement will be a benefit of the project? Who are they considering as beneficiaries and why?

Bearing in mind that Hydro-Quebec was involved in the report; what were the lessons drawn from a process like the Great Whale Hydroelectric Project (proposed by Hydro-Quebec) and its guidelines<sup>12</sup>? That process is considered as a benchmark for environmental impact statements developed in intercultural contexts. It recognises the importance of TEK<sup>13</sup> documentation, cumulative effects and the introduction of two

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<sup>10</sup> During the Plebiscite of 1990, the 'Coalition of Parties for Democracy' promised constitutional recognition to Indigenous Peoples and the resolution of land claims. Some Mapuche leaders supported the Coalition and believed in its promises.

<sup>11</sup> This review was elaborated by CIPM Yangtze Joint Venture, consortium which includes three private companies and two public companies, one of them Hydro-Quebec International (Gleick 2009).

<sup>12</sup> Evaluating Committee; Kativik Environmental Quality Commission; Federal Review Committee North of the 55<sup>th</sup> Parallel; Federal Assessment Review Panel (1992): Guidelines: Environmental Impact Assessment for the proposed Great Whale River Hydroelectric project. Great Whale Public Review Support Office, Montréal

<sup>13</sup> Traditional Environmental Knowledge

innovative ideas; The concepts of 'multicultural definition of the environment' and 'culturally valued ecosystem components' contributing to a framework for intercultural assessment (Mulvihill & Baker 2001). None of these important considerations for a social impact process have been reflected in the Three Gorges Dam feasibility study. On the contrary, it seems that this review is an example on how an Impact Assessment should not be done, and a 'grave embarrassment to the impact assessment profession (Fearnside, 1994: 21).

The independent review of the SSP<sup>14</sup> in Narmada River (Berger 1994) totally differs in its process from the report previously mentioned. Resettlement and rehabilitation measures were assessed under an independent and public process. The effects of the SSP are similar to those of other hydropower projects; flooding of ancestral lands and relocation for the 'great of the majority'. Berger's independent report reflects the importance that Terms of Reference will have on a study and how people could be excluded from the report by simply ignoring them in the initial stages.

This process also reveals the importance of talking to all sides, visiting relocation sites and interviewing people. Berger's research was enriched by the collection of formal and technical data as well as from public input and 'what we were able to see for ourselves' (Berger 1994 p.59). The author mentioned that NGOs had better access to people than government organisms and employees, especially in affected villages. Similarly, Mapuches have found more reception and commitment from international organisations and NGOs than from government agencies.

Nonetheless, a good process could be easily lost if the outcomes do not relate to the process objectives and ethical considerations. Chattopadhyay (2010) analyses how Adivasis<sup>15</sup> social spaces are disturbed by the dislocation resulted from the construction of the SSP. A feeling of betrayal by the government, inadequate compensation packages, resettlement areas of poor quality and displaced communities left to live in severe marginalization have also been highlighted (Dwivedi 1999).

The outcomes of decisions made upon good processes that seek for consensus and sharing of benefits are much more desirable than those that exclude people from it. Enhancing the importance of such a process in every stage of a SIA would be useful to convince commissioners of the benefits, not to mention the cost reduction that could be achieved through an inclusive process.

However, this ideal situation involves challenges that relate to power, ethics and especially to the way we conduct impact assessments. These challenges will not be easily overcome unless the ones situated in a privileged position recognise the importance of achieving consensus through cultural respect and inclusion.

- **How could a decision-making process be more fair and participative?**

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<sup>14</sup> Sardar Sarovar Projects

<sup>15</sup> Adivasi is an accepted term in the Indian context and it is used by the people to define their identity as original inhabitants' (Chattopadhyay 2010).

Public Participation is a required process in many countries as part of an EIA, including Chile. However, the existence of such a legal requirement has not implied an empowerment of minority groups or an increase of their capacity to shape the outcomes of decisions. Usually, public participation is reduced to a superficial process where important decisions have already been made. This kind of public participation differs from an effective public participation, since it does not allow common citizens or local communities to contribute in the definition of impacts or in the contribution of inputs that could modify the proposal, not to mention the consideration of non development.

If we consider the concept of 'democracy', we could say that through our vote the government would have the power to decide over a project considering the 'interests of the nation' since people gave them that power through a democratic suffrage. However, if we explore the concept of 'democracy' in a more critical way, we could see that democracy could also be perceived as the tyranny of the majority, especially when it fails to respond to the challenge of dealing with minority groups and their interests. In this sense, a clear commitment to develop a good participatory process is vital. Examples of ineffective public involvement can be found in democratic countries, which shows that the existence of a democratic society does not imply that peoples' inputs will be considered in the assessments of mega projects or policy decisions.

- **The concept of 'national interest'**

Governments in different countries usually generate national policies and targets that impose unsustainable, unreasonable and unethical burdens (Howitt 2003) on powerless communities. These policies and targets should be opened to public scrutiny, and should be debatable. The consideration of 'water scarcity' and 'energy needs' must be contextualised and discussed and should not be considered as inevitable. In this sense, it is important to debate on the fundamental reasons behind the construction of 'HidroAysén' project<sup>16</sup>. There are some that believe that development is impossible without it. Others argue that this project's objective is to sustain the mining industry in the north of Chile (International Rivers 2009).

In this sense, it is important to question the concept of 'national interest' since this idea is generally imposed over minorities' interests, marginalising them from decisions that affect their lands, culture and values. Therefore, what could be the benefit of having a legal requirement such as a public participation instance, if the project has already been considered as one of 'national interest'?

The negotiation of the outcomes of a project should include the contributions made by minority groups, since they are the ones that have lived in those contested geographic spaces and they will be the most affected ones if the processes behind the decision making

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<sup>16</sup> A new hydroelectric project proposed by Endesa in Chilean Patagonia which resolution is still pending.

are neither just nor participative. The recent approval of the Convention 169<sup>17</sup> and the recognition of the term 'peoples' represents an important step towards the recognition of indigenous people's right to self determination (Donoso 2008). This Convention encourages the communities themselves to determine their own outcomes while negotiating an agreement, instead of complying with arrangements shaped by others.

Nevertheless, after more than a decade, impact assessment studies of hydropower projects have not allowed indigenous peoples to be the engineers of social change rather than objects of mitigation (O' Faircheallaigh, 1999).

### ○ The role of impact assessors

Chilean impact assessment practice is far from integrating TEK and non expert's knowledge in formal assessments, and this reveals the non recognition of multicultural diversity and the imposition of a dominant world view. It seems that participatory, empowering and interventionist (Howitt 1993) approaches to impact assessments are not a priority in our country. We should be able to acknowledge the cultural concerns of people that would be directly affected by a project even though these concerns might be 'intangible' or difficult to measure. This does not mean that they do not exist. Perhaps we should consider to respect, acknowledge and recognise in practical situations the different believes and cultural realities that exist in our country.

In this scenario, we could ask ourselves, what is the role of impact assessors, how could they ensure their work to be ethical, even though sometimes they have been hired by the project's proponent? This is a serious issue when prestigious universities hire young professionals without experience to develop EIS or EIA. The benefits perceived by this institution could allow it to stand as a leader among their peers by renewing their installations and infrastructure. Nonetheless, we could reflect about the conflicts of interests that could compromise the ethics behind that situation.

Similarly, the 'paternalistic role of the development professionals' (Botes & Van Rensburg, 2000 pp. 42) reflects the belief that experts know best and consequently undervalue non specialist's knowledge and the capacity of local people to make contributions through their traditional knowledge. The dominant culture will determine whose knowledge is the most 'reliable' one. However, sometimes technical expertise has failed to identify suitable sites and the inclusion of people's traditional knowledge have been a valuable tool to determine sites that are preferred by diverse stakeholders and that even imply lower costs for the proponent and for the community (Howitt 2003).

We could take this as a challenge, and as an opportunity to try to encompass in SIA and EIA the two apparently opposed approaches; technocratic and participatory. In this sense, we could be rigorous as it is expected from 'scientists' to be and we could also

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<sup>17</sup> International Labour Organisation: Convention on Indigenous and tribal peoples.

improve the participatory methods, advocating for processes that would allow for a more inclusive planning of our territory (Lane, Ross and Dale, 1997).

The inclusion of all stakeholders and especially local communities in every step of the EIA, is not an impossible task. It just needs that the ones that have the education, power and the means to put themselves in other's shoes finally do so.

- **Conclusions**

Confrontation among different cultural groups has been an ineffective mechanism to achieve conflict resolution in Chile, weakening trust among indigenous peoples and the dominant culture. This situation works as a vicious circle where communities neither participate nor provide information to impact assessors as they believe that once again, this information will not be considered as an input for the final decision. In this scenario, it is not surprising that indigenous communities will turn to seek international partnership or will impose legal action through international organisations.

We will need a revolution from our deep understanding of the world, a reconnection with our land and with the people who live in it. Stoffle and Arnold (2003 p. 246) suggest that societies should accept the 'principles of human-nature co-adaptation' and that we must 'learn and change' to be able to live sustainably.

Unfortunately, the examples reviewed in these paper show that we have not incorporated the lessons achieved from past experiences. As Mulvihill and Baker (2001) state, the lack of lesson transfer in EIA erodes communities trust in future processes.

The ideas exposed here, reflect great challenges to current power structures and to authorities and impact assessors that are comfortable in their current positions. Many might find these ideas as threatening, but such reaction would only strengthen the notion that their situation in the current system is relatively secure. The possibility of giving minority groups the opportunity to set their own agenda would probably prompt apprehensive responses. These changes will take time and would require a re-education on values such as respect and recognition of multiculturalism, justice, equity and empathy.

We must scrutinise our way to approach conflicts and strive to achieve a more cooperative way to consider them. Agreements are not easy to achieve and perhaps the recognition of 'wicked problems' (Pacanowsky 1995 p.36) could help us understand that the existence of multicultural and diverse definitions of the environment are not a problem, but a reality that we must recognise in order to develop ways to negotiate an agreement. In this sense, the solution to 'wicked problems' involve us in a dialogue and might need 'the greater possible collective understandings of the problem'. These kinds of problems defy what we understand by 'the problem' and they invite us to think 'outside the box' (Pacanowsky 1995 p. 37).

These concepts involve us in the challenge of addressing processes in a different way, recognising minorities' interests and concerns. More inclusive and participatory processes will allow us to deal with energy issues, post-earthquake reconstruction and mega projects



in a way that would at least allow for the possibility of debates and different opinions to emerge and be considered.

Only by acknowledging the different world views existing in our country and engaging with them in respect and recognition, we would be able to rebuild trust and stronger relationships among stakeholders, who would otherwise continue to be fragmented and contributing to conflicts rather than solutions.

### REFERENCE LIST

Arfi R (2005) Seasonal ecological changes and water level variations in the Sélingué Reservoir (Mali, West Africa) *Physics and Chemistry of the Earth* 30 (6-7): 432-441.

Assani AA, Gravel E, Buffin-Bélanger T, Roy AG (2005) Impacts of dams on the annual minimum discharges according to artificialised hydrologic regimes in Quebec (Canada) *Revue des Sciences de l'Eau* 18 (1): 103-127.

Aylwin J (2002) The Ralco Dam And The Pehuenche People In Chile: Lessons From An Ethno-Environmental Conflict. Institute of Indigenous Studies University of la Frontera, Temuco, Chile.

Berger TR (1994) The Independent Review of the Sardar Sarovar Projects 1991-92 *International Journal of Water Resources Development*, 10(1): 55-66.

Carruthers D, Rodríguez P (2009) Mapuche Protest, Environmental Conflict and Social Movement Linkage in Chile *Third World Quarterly*, 30 (4): 743-760.

Chattopadhyay S (2010) Narrating Everyday Spaces of the Resettled Adivasis in Sardar Sarovar Population, Space and Place 16: 85–101.

Chilean Law 19.253 Indigenous Law from the Minister of Planning and Cooperation, [http://www.uta.cl/masma/patri\\_edu/PDF/LeyIndigena.PDF](http://www.uta.cl/masma/patri_edu/PDF/LeyIndigena.PDF), 14 May 2010.

Donoso S (2008) Chile y el Convenio 169 de la OIT: Reflexiones sobre un desencuentro. Pontificia universidad Católica de Chile. Vicerrectoria de Comunicaciones y Asuntos Públicos.

Dwivedi R (1999) Displacement, Risks and Resistance: Local Perceptions and Actions in the Sardar Sarovar *Development and Change* 30: 43-78.

Fearnside P (1994) The Canadian Feasibility Study of the Three Gorges Dam Proposed for China's Yangtze River: A Grave Embarrassment to the Impact Assessment Profession *Impact Assessment* 12(1): 21-57.

Games V (2006) Ciudad y Periferia metropolitana en transición. Configuración de entidades comunales en el Gran Santiago *Diseño Urbano y Paisaje* (3):1-38.

Gleick PH (2009) Three Gorges Dam Project, Yangtze River, China. *The World's Water 2008–2009 Water Brief* 3: 139-150.

Hirsch P, Wyatt A (2004) Negotiating Local Livelihoods: Scales of conflict in the Se San River basin *Asia Pacific Viewpoint* 45(1): 51–68.

Heming L & Rees P (2000) Population Displacement in the Three Gorges Reservoir Area of the Yangtze River, Central China: Relocation Policies and Migrant Views *International Journal of Population Geography* 6: 439-462.

Howitt R (1993) Social Impact Assessment as 'applied peoples' geography' *Australian Geographical Studies* 31(2): 127-140.

Howitt R (2003) Local and non-specialist participation in impact assessment. Strategic Management of Environmental and Socio-Economic issues: A Handbook. C.Q. Liu, Z. Zhao, T. Xiao and J. Guha. Guiyang, China, *Guishou Science and Technology Publishing House*: 27-36.

Huang H, Yan Z (2009) Present situation and future prospect of hydropower in China *Renewable and Sustainable Energy Reviews* 13 (6-7): 1652-1656.

Imhof A, Lanza GR (2010) Big dams have a serious record of social and environmental destruction, and there are many alternatives. So why are they still being built? *World Watch* 23 (1): 8-14.

International Rivers (2009) Patagonia's Wild Rivers at Risk, [http://www.internationalrivers.org/files/Patagonia\\_factsheet\\_FINAL0209.pdf](http://www.internationalrivers.org/files/Patagonia_factsheet_FINAL0209.pdf), 19 May 2010.

Kaygusuz K (2009) The role of hydropower for sustainable energy development *Energy Sources, Part B: Economics, Planning and Policy* 4 (4): 365-376.

Mulvihill PR, Baker DC (2001) Ambitious and restrictive scoping: Case studies from Northern Canada *Environmental Impact Assessment Review* 21: 363-384.

O'Faircheallaigh (1999) Making Social Impact Assessment Count: A negotiation-Based Approach for Indigenous Peoples *Society & Natural Resources* 12: 63- 80.

Orellana A (2004) The Centre for International Environmental Law (CIEL) Human Rights & Environment Publications Indigenous Peoples, Energy, and International Justice: The Pangué/Ralco Hydrologic Project in Chile's Alto BioBio, [http://www.ciel.org/Publications/Ralco\\_Brief\\_22Jul04.pdf](http://www.ciel.org/Publications/Ralco_Brief_22Jul04.pdf), 18 May 2010.

Pacanowsky M (1995) Team tools for wicked problems *Organizational Dynamics* 13(3): 36-51.

Rosenberg DM, Bodalay R A, Usher P J (1995) Environmental and Social Impacts of large scale hydroelectric development *Global Environmental Change* 5(2): 127-148.

Skjævestad A (2008) The Mapuche People's Battle for Indigenous Land. Litigation as a Strategy to Defend Indigenous Land Rights *Michelsen Institute CMI Working Paper* 3.

Stoffle R, Arnold R. (2003) Confronting the Angry Rock: American Indians' situated risk from radioactivity, *Ethnos* 68(2): 230-248.

United Nations Economic and Social Council Commission on Human Rights (2003) Report of the Special Rapporteur on the situation of human rights and fundamental freedoms of indigenous people, Mr. Rodolfo Stavenhagen, submitted in accordance with Commission resolution 2003/56, <http://www.un.org/News/Press/docs/2004/hrcn1079.doc.htm>, 27 May, 2010.

Wüstenhagen R, Markard J, Truffer B (2003) Diffusion of green power products in Switzerland *Energy Policy* 31 (7): 621-632.

Yüksel I (2010) Hydropower for sustainable water and energy development 2010 *Renewable and Sustainable Energy Reviews* 14: 462–469.