Hydropower Development and Indigenous Rights in Malaysia: Socioeconomic Harms, Cultural Displacement and Comparative Legal Lessons from Canada and Brazil

Aida Nurshafi Md Shabree[1], Dania Zulaikha Nazli[2], Mai Syuhaidah Shamsari[3], Amirah Khalidah Mohd Faiz[4], Muhammad Iman Norhizam[5], Hanafi Haron[6], Siti Sarah Sulaiman[7], Mohd Haris Abdul Rani[8]

[1,2,3,4,5,7,8] Faculty of Law, Universiti Teknologi MARA, Malaysia

[6] Centre for Innovation and Technology Transfer, Universiti Kebangsaan Malaysia, Malaysia

***Corresponding Author**

DOI: https://doi.org/10.47772/IJRISS.2026.10100418

Received: 24 January 2026; Accepted: 30 January 2026; Published: 09 February 2026

ABSTRACT

Hydropower gained high popularity in Malaysia in the context of the promotion of national decarbonisation and renewable energy sources. Nevertheless, the ongoing development of hydroelectric dams on a large scale has resulted in the development of legal and governance issues, especially where the construction of the dams intersects with land, livelihood and cultural integrity of the Indigenous communities. This paper discusses the socioeconomic and cultural impacts of hydropower dams on Indigenous people through the Malaysian legal lens and with some Canadian and Brazilian experiences, as these countries have more defined norms of Indigenous involvement and protection in resource development. Using a qualitative doctrinal approach, the study examines Malaysian legislative and policy frameworks of developing renewable energy and judicial jurisdiction of acknowledging Indigenous customary rights, such as the Adong Kuwau and Sagong Tasi cases. It is a comparative analysis to evaluate the manner in which Canadian and Brazilian legal systems respond to the responsibilities of consultation, as well as how they respond to the Indigenous land protection and consent-based governance of energy project approvals. The results indicate that the existing regulatory orientation in Malaysia is more focused on development agendas and the provision of little procedural protection that can cause displacement, cultural loss and socioeconomic turmoil in the long run among the affected Indigenous populations. The paper also concludes that the application of the compensation-based frameworks in Malaysia is still inadequate when the hydropower development leads to structural damage to the traditional tenure, cultural heritage and subsistence activities. The study uses lessons learned in other countries to recommend legal and institutional changes to empower Indigenous participatory rights, incorporate the standards of consultation in the governance of energy resources and align hydropower development with the principles of energy justice and sustainable development. The paper will add to the existing body of socio-legal research by elucidating the regulatory gaps in the current hydropower policy in Malaysia and providing a form of reform based on rights-based regulation of renewable energy.

Keywords: Hydropower; Hydroelectric Dams; Indigenous Peoples; Customary Land Rights; Comparative Energy Law

INTRODUCTION

Hydropower is often positioned as one of the potential ways of decarbonisation and energy security, especially for developing countries aiming to increase their renewable energy resources in order to handle the growing demand. The promotion of large hydroelectric dams in Malaysia has been discussed in the context of the broader planning of renewable energy transition and national development. Nevertheless, despite the implication of hydropower as a low-carbon option in the climate positioning, the grand development of dams is still creating far-reaching socio-legal debates as the projects overlap with Indigenous territories, subsistence livelihoods, cultural heritage and customary land tenure. The displacement and the subsequent loss of access to

the traditional resources and the long-term disruption of the community pose a serious question about whether the existing regulatory and governance framework in Malaysia is sufficient to protect the Indigenous rights in the energy development.

The article focuses on the socio-economic and cultural effects of hydroelectric dams on the Indigenous peoples with Malaysian legal views. It claims that Malaysian judicial recognition of customary interests in pockets creates the situation that the overall institutional framework by which hydropower development takes place has not been suitably prepared to avert structural wrongs to Indigenous communities, especially when the administrative decision-making is overshadowed by priorities of development. The compensation-based approaches can become an exclusive remedial factor in this context, which neglects the cultural depletion, the continuity of the community and the socioeconomic impacts of relocation. The paper thus takes a step forward in promoting the argument that the governance of hydropower should be viewed not only as an energy and infrastructure issue, but as a rights-based regulatory question that lies in the broader framework of sustainable development and energy justice.

The novelty of this study lies in its integration of three analytical strands that are often treated separately in the Malaysian literature. First, it brings into direct conversation Malaysia's hydropower development trajectory with the legal treatment of Indigenous customary land rights, as interpreted in leading Malaysian judicial authorities. Secondly, it focuses specifically on the socioeconomic and cultural dimensions of dam impacts, rather than treating Indigenous displacement as a secondary consequence of development. Thirdly, it employs a reform-oriented comparative lens by drawing lessons from Canada and Brazil. In these two jurisdictions, Indigenous participation, consultation duties and constitutional protections have generated more explicit legal thresholds for resource development in Indigenous territories. The comparative component is not intended to suggest legal transplantation, but to distil functional safeguards that may strengthen Malaysian regulatory design, particularly in relation to participatory rights and enforceable consultation standards.

Accordingly, this article addresses the following research questions. How does Malaysian law presently regulate the impacts of hydroelectric dam projects on Indigenous peoples, particularly in relation to land tenure recognition, compensation and access to remedies. To what extent does the existing governance framework sufficiently protect socioeconomic welfare and cultural integrity when large dams are approved or implemented. What legal mechanisms emerging from comparative jurisdictions may inform Malaysian reforms to align hydropower development with sustainable development principles and rights-based renewable energy governance.

The remainder of the article proceeds as follows. The next section outlines the conceptual context of hydropower development and the nature of socioeconomic and cultural harms commonly associated with dam construction. The subsequent sections examine Malaysia's legal position on Indigenous customary rights and the adequacy of existing safeguards governing hydropower projects. Comparative discussion of Canada and Brazil is then introduced to highlight reform-relevant mechanisms, including enforceable consultation duties and consent-based participation standards. The article concludes by proposing a set of legal and governance reforms designed to strengthen Indigenous safeguards and harmonise Malaysia's hydropower transition with energy justice and sustainable development commitments.

LITERATURE REVIEW

Hydroelectric energy and dams

Hydroelectric energy, often known as hydropower or hydroelectricity, is a form of energy that produces electricity by harnessing the power of moving water, such as water flowing over a waterfall (National Geographic Society, 2019). According to the United Nations Environment Programme (UNEP), Hydropower is the world's most significant single renewable energy source, supplying 16 % of global electricity at affordable prices. In several developed, emerging and developing countries, hydropower is dominating the electricity mix. With over 370 GW of installed hydropower capacity in 2020, China remains the world leader. Brazil (109 GW), the United States (102 GW), Canada (82 GW) and India (50 GW) round out the top five. Japan and Russia are close behind India, with Norway (33 GW) and Turkey following (31

GW) (International Hydropower Organization, 2021).

Dams have been used to construct hydroelectric facilities, including impoundment, diversion and pumped storage, as one of the effective instruments (Office of Energy Efficiency and Renewable Energy. (2020). The quantity of energy available from moving water in hydroelectric dams is governed by the volume of water flowing as well as the elevation change (often referred to as the head) from one site to another, whereby electricity is produced, the bigger the flow and the higher the head.

The most cost-effective renewable energy source is hydropower, which is typically competitive with current energy costs (Berga, 2016). This is due to the fact that river water is a domestic resource that, unlike fuel or natural gas, is not susceptible to market volatility (Water Science School, 2018). Furthermore, since the output of electricity can be adjusted, it is a very reliable renewable energy source. When energy demand is low, water can be diverted away from the turbines, resulting in less energy being produced. In contrast to the solar system, which only has battery storage, hydropower, in the form of pumped storage power plants, is the only viable and usable technique to store energy today, accounting for 97.5 % of worldwide energy storage in electricity networks.

Sustainable energy with hydroelectric dams

Unlike power plants, which burn fossil fuels such as coal or even natural gas, hydropower is fuelled by water, which makes it a clean source of energy as well as a sustainable one. However, the level of sustainability has decreased as the years go by. This is due to the ongoing issues of deforestation, disruption of river ecology and even loss of aquatic and terrestrial biodiversity, to name a few (Moran et al., 2018). A recent literature review has also shown that hydroelectric dams are damaging and unsustainable (Climate Action. (2018; International Hydropower Association, 2021). Those who build their lives near these hydroelectric dams have disrupted the quality of the water while also taking hold of the food system and agriculture (Soukhaphon et al., 2021). Meanwhile, another study states that hydroelectric dams contribute to global warming pollution. To put things into perspective, trees and forests need to be cut down to make room for the huge reservoirs to be built (American Rivers, 2021). As a consequence of this, there are way fewer trees readily at hand to absorb the carbon dioxide released by fossil fuels. This seems to be a significant problem with hydroelectric dams.

Impacts of Hydroelectric Dams around the world

Furthermore, dams and hydroelectric power facilities have had both beneficial and harmful environmental consequences. Because hydroelectric energy does not release any byproducts, one of the positive consequences of hydroelectric power plants has been a reduction in carbon emissions. Because of the lower emissions, hydroelectric energy is far more environmentally benign than thermal energy. Another beneficial effect has been the reduction in energy imports, as Turkey imports over 90% of its energy (U.S. Energy Information Administration, 2017).

Land acquisition and resettlement issues have also arisen because of these developments. The Southeastern Anatolia Project, with the translation of Güneydoğu Anadolu Projesi (GAP), the Atatürk and Karakaya projects, resulted in 100,000 people being displaced. Hundreds of communities in Turkey have been impacted by dam and hydroelectric power plant construction projects. As a form of compensation, some residents were given land. On the other hand, some individuals were allowed to return to their homes when the dams or power plants were built, if that was possible (Berkun, 2010).

Other than the resettlement issues, the construction of dams has caused siltation of rivers in the Province of Benguet, in the Philippines, arising from mining operations and dam construction (United Nations, 2007). The Ambuklao and Binga dams are distinct examples of the destructive impacts of siltation and mega dams on rivers. The rising level of silt in the dam stock and along the Agno River upstream of the dams is overspreading a larger area around the dams and is destroying more paddy fields.

Hydroelectric dams and indigenous people

Malaysia has substantial hydropower resources, albeit they are unevenly spread across the country, with higher concentrations in Sabah and Sarawak: the Chenderoh Dam (27MW), the first large hydroelectric dam. From an entire installed capacity of 6240MW, systematic development of the country's natural resources has contributed around 27,300GWh of energy yearly in the decades afterwards.

However, it is important to note that they sometimes emerge and present as social and environmental challenges towards a group of communities, including the resettlement of those affected individuals and communities, such as indigenous people (Fadzilah et al., 2017). The construction of the dam consequently deprives these affected communities of their rights, such as losing their assets and changing their lifestyles.

Meanwhile, in Ethiopia, the Ethiopia Gibe III Dam has threatened and affected at least 200,000 people from the existing eight tribes in the Lower Omo Valley (Vidal, 2010). Although it has been made known that some of the tribes have been resettled, the building of the dam has primarily affected the lives of farmers, fishermen, as well as the tribes whose lives relied on the Omo's natural flow to support their livelihoods. It further harmed the fisheries zone and caused a severe food shortage (Parker, 2017).

On the other hand, in the Philippines, the construction of a 143-metre dam sponsored by China will have a higher tendency to affect thousands of acres of tribal communities' land. It is a contract between a Philippine company and the publicly owned China Engineering Co Ltd, back in 2019. It involves the Pulangi River that flows near the Pantaron range of central Mindanao, where the Manobo Tribe's livelihood heavily relies on producing food, growing crops and medicinal plants (Aspinwall, 2020). This project, however, is designed to change the landscape in the southern Philippines and will result in the displacement of dozens of tribal communities from the river basin in Bukidnon, which they consider home. An issue also arises on the fact that no consent has been obtained from the Indigenous communities to continue with the dam construction as required by law.

The installation of the dam has indirectly breached the rights of indigenous peoples and went against the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which jointly safeguards the rights of indigenous people throughout the world, which may not be covered in other instruments of human rights charters (United Nations, 2008). As entrenched under Article 1 of the UNDRIP, it states that "Indigenous peoples have the right to the full enjoyment, as a collective or as individuals, of all human rights and fundamental freedoms as recognised in the Charter of the United Nations, the Universal Declaration of Human Rights and international human rights law." In this regard, the Declaration served to cover the rights of Indigenous peoples in exercising their rights to enjoy cultures, religions and customs in any way possible.

RESEARCH METHODOLOGY

This study employs a qualitative socio-legal research design grounded in doctrinal legal analysis and supported by targeted comparative legal examination. The primary component is doctrinal research, involving systematic analysis of Malaysian legal materials governing hydropower development and Indigenous protection, including relevant statutes and policy instruments, as well as key judicial authorities recognising Indigenous customary rights. In particular, the study analyses the legal principles developed in Adong bin Kuwau & Ors v Kerajaan Negeri Johor & Anor and Sagong bin Tasi & Ors v Kerajaan Negeri Selangor & Ors to evaluate how Malaysian law recognises customary tenure, regulates compensation and provides remedies where development projects result in displacement and socioeconomic disruption.

To strengthen the reform analysis, the study incorporates a focused comparative approach using Canada and Brazil as reference jurisdictions due to their stronger legal recognition of Indigenous participation and protection norms in resource development. Canadian constitutional protection under section 35 of the Constitution Act 1982 and jurisprudence on the duty to consult (including Haida Nation v British Columbia (Minister of Forests)) are examined alongside Brazil's constitutional recognition of Indigenous territorial rights and FPIC-linked standards. Legal materials are evaluated thematically across governance issues, including participation, resettlement, compensation adequacy, cultural protection and access to remedies. Secondary

academic literature and institutional reports are used to contextualise implementation realities and support the socio-legal discussion.

FINDINGS & DISCUSSIONS

Comparative governance context

Comparative jurisdictions demonstrate that hydropower governance increasingly incorporates enforceable safeguards aimed at protecting Indigenous territorial interests and participatory rights. In Canada, Indigenous protections are constitutionally entrenched and operationalised through structured consultation duties, while Brazil's constitutional framework recognises Indigenous territorial rights amid ongoing contestation over development pressures and land security. These comparative features are examined later in this article to distil reform-relevant safeguards for strengthening Malaysia's hydropower governance.

Laws regarding energy regulation in Malaysia

The Malaysian Renewable Energy Act set out to catalyse the country's renewable energy sector when it was initially prepared and later ratified by Parliament in 2011. The law established a feed-in tariff programme to encourage the use of renewable energy sources for power generation. These are non-depleting indigenous resources or technologies that are available on a regular basis.

The Renewable Energy Act was a welcome measure because it resulted in consistent progress, as opposed to the uneven results of the Malaysian government's previous attempts to promote renewable energy (Oh et al., 2014; Government of Malaysia, 2011; Sustainable Energy Development Authority Malaysia, 2009). Renewable energy in Malaysia, however, is still only half of the country's official targets, nearly ten years after it was put into place. Renewable generation in 2017 was 528.06 MW, compared to a government target of approximately 1,000 MW, according to the most recent accessible information (Sustainable Energy Development Authority Malaysia [SEDA], 2018).

Government officials in Peninsula Malaysia disputed the Temuan people's land rights, which were displaced by the Sungai Selangor dam, a US$2 billion water supply project around 60 kilometres from Kuala Lumpur. Rather than recognising the Temuans' rights to the entire region that they have traditionally used, the government is only paying them a small sum of money and two hectares of land per family under government resettlement programmes. The Temuan and Negrito peoples, who make a living through agroforestry, hunting, fishing and work as ecotourism guides, claim that this is unconstitutional. They point out that the High Courts have recognised proprietary rights of Aboriginal peoples over ancestral and customary lands in at least two landmark decisions (Adong bin Kuwau & Ors v. Kerajaan Negeri Johor & Anor, 1997; Sagong bin Tasi & Ors v. Kerajaan Negeri Selangor & Ors, 2002). More broadly, legal and policy scholarship continues to highlight persistent structural weaknesses in the protection of Indigenous customary land rights in Malaysia (Cooke et al., 2017; Human Rights Commission of Malaysia [SUHAKAM], 2013; Natural Justice & ICCA Consortium, 2021; Sahabat Alam Malaysia, 2021; Swainson, 2008; Utusan Konsumer, 1999).

Impacts of hydroelectric dams from a socio-cultural perspective

The adverse socio-cultural impacts which will be discussed include "boomtown effects", loss of cultural heritage, forced population displacements (Cernea, 2004). A boomtown effect happens when a community experiences sudden growth due to economic shock, which can sometimes be caused by the development of natural resources (Romich et al., 2016). For instance, what was once used as a passage for the villagers to guide their journeys to the valleys will now be gone (Ronayne, 2005). The construction of dams would separate the villages from one another and isolate them from the bigger towns. Along with that segregation, the people also have to suffer the consequences of not being able to have access to hospitals in cases of emergencies. Take Brazil, for example, where the construction of some 40 hydroelectric dams around the Tapajós river by 2024 would allow for the exportation of soya under the industrial waterway to become a much easier process (Vidal, 2016). In addition, the Brazilian government, along with the energy companies, have been pushing for these dam constructions in the hopes that it would help solve the country's ongoing

electricity shortages (Hunt et al., 2022).

However, that would in turn cause damage to the heart of the Amazon, home to the indigenous people, with Greenpeace stating that it would be a "...disastrous ecological and economic mistake"(Vidal, 2016). Under the loss of cultural heritage assets, buildings and places that were once used for cultural events or religious symbols are affected due to the construction of these hydroelectric dams. For example, the Belo Monte dam will cause the tribes in Kayapo, Arara, Juruna and Parakana Indians, to name a few, to lose their traditional and only way of life, including their source of food (Survival International, 2019). In terms of forced population displacements, let it be known that when some eight dams and hydroelectric power plants were built in Tunceli, Turkey around what would now be known as the Munzur Valley dams, the villagers and local people stated that the only reasons why the dams were built was to bring profit to companies and to "get people outside the place where (they) live" (Romich et al., 2016). Not only that, when interviewed, one of the villagers stated that they did not have enough information on the socio-cultural damage that the dams would bring when they were still being constructed; however, now that they are suffering from those damages, it is too late. These were the confessions of a villager whose home will be submerged by the building of the Uzunçayır dam.

Ethical concerns for the future development and implementation of hydroelectric dams

Although one may argue that ethical concern is needed when the installation of dams is to be conducted so as to preserve the natives and the river, it appears to be a slightly challenging task to achieve this goal.

This is essentially because, in reference to the early findings, Section 12 of the Aboriginal Peoples Act 1954 has made it clear that the State Authority may grant compensation to the people entitled, or those affected, upon the land reserved for the purposes specified under this Act (Aboriginal Peoples Act 1954).

This generally means that there will still be a constant relocation of indigenous people and those affected by this requirement of law, despite being compensated for their loss of occupancy, because dams somehow made a significant contribution to the development of the countries economically (Swainson, 2008; Moran et al., 2018). In other words, while the dams' construction may affect the lives of the tribes, it may also provide positive economic and considerable benefits to the developing world. For instance, dams provide water for drinking, growing food and power when it would not otherwise be available. They also provide an enhanced environment and recreation for many. Without dams, the industrial revolution on which our wealth is based would have been much delayed. Without hydropower, greenhouse gas emissions would have been greater and hence climate change would have increased.

This can be discussed in line with the case of Kajing Tubek & Ors. v. Ekran Bhd. & Ors, which is not to explain but to reflect the detrimental effects of the dam's construction towards indigenous people. In this case, the plaintiffs, who are aboriginal people, suffered damage as a result of the Project, which is the dam's construction and they also did not have a locus standi to bring an action, which further affects the plaintiffs' legal interest in their own lands (Gwynne, 2018). The law, as it should, protects the public as well as the environment when considering the construction of dams.

Therefore, in this analysis, not only was the law needed to be more effective in protecting and preserving the indigenous peoples' rights, but also the impact the dams will have on the environment. This is achieved by taking into account the law, emphasising the requirement to protect the natural habitat while installing the hydroelectric dams. As an example, the Bakun dam in Sarawak has displaced 10,000 tribal people, including many semi-nomadic Penan tribespeople (Vidal, 2010). The relocated Penan can no longer hunt and struggle to support themselves on tiny plots of land. Sarawak plans 12 more hydroelectric dams, which will force thousands more people to move.

One of the possible solutions for the socioeconomic and cultural impacts of hydroelectric dams is to adopt fish-friendly dams. This is also known as the adaptive management method, which works to minimise the environmental impacts and to provide hydropower more sustainably. This can be done, for instance, by using turbines that are more efficient or fish-friendly, or by lowering the height of dams. Electricity production can

even be stopped at crucial times to help fish pass upstream (Oakes, 2019).

To evaluate the adequacy of Malaysia's legal safeguards, this article employs a focused comparative lens using Canada and Brazil as reference jurisdictions. These jurisdictions are selected because both demonstrate stronger legal recognition of Indigenous rights in the context of resource and infrastructure development and provide workable governance mechanisms for participation, consultation and territorial protection. The purpose of the comparison is not legal transplantation, but functional learning. Accordingly, the comparative analysis is structured around three governance variables that are central to hydropower impacts on Indigenous peoples: recognition of Indigenous land and tenure rights, enforceable participation standards (including consultation and consent-related norms) and the availability of effective remedies and institutional enforcement. These variables provide a structured basis for assessing Malaysia's current framework and identifying reforms capable of preventing displacement, cultural loss and long-term socioeconomic disruption.

Canada: Duty to Consult and Accommodate in Hydropower Development

Canada is a particularly instructive comparative jurisdiction for hydropower governance affecting Indigenous peoples because Indigenous rights are constitutionally entrenched and have been operationalised through a robust body of jurisprudence that imposes enforceable procedural obligations on the State. Section 35 of the Constitution Act 1982 recognises and affirms "existing aboriginal and treaty rights", thereby positioning Indigenous rights as constitutional constraints that must be reconciled with state-led resource development and infrastructure expansion.

The Supreme Court of Canada has developed these protections into a governance framework through the duty to consult and, where appropriate, accommodate Indigenous communities. In Haida Nation v British Columbia (Minister of Forests), the Court held that the honour of the Crown requires consultation when the Crown has real or constructive knowledge of potential Aboriginal rights or title and contemplates conduct that may adversely affect them. Crucially, the duty arises even before rights are finally proven in court, meaning that consultation is not delayed until full legal recognition and is therefore preventative rather than merely remedial. The depth of consultation is proportionate to the strength of the claimed right and the seriousness of potential harm. This proportionality principle is highly relevant to hydropower projects because dams tend to cause cumulative and long-term impacts on river systems, access to traditional resources, relocation pressures and cultural site integrity.

Even though the duty to consult does not necessarily impose an Indigenous veto, the consultation requirement should be meaningful and undertaken in good faith. It may entail the existence of accommodation measures in situations where the effects are substantial. The legal impact of this doctrine is that the idea of Indigenous participation is handled as an organised procedural protection that is inherent in the administrative decision-making and is not a policy practice. Canada, as a reform model, shows that enforceable consultation obligations can work to re-tune state discretion on giving the green light to infrastructure projects primarily in situations where Indigenous people incur irreparable losses not sufficiently redressed by financial restitution.

The Canadian model, in its comparison with that of Malaysia, can teach that country two important regulatory lessons. To begin with, judicial operationalisation of consultation can be achieved by the use of precise thresholds that would initiate the engagement obligations at an early stage of the approval process. Second, proportional consultation requirements offer a gradual method of distinguishing between low-impact renewable undertakings and those that are major hydropower undertakings with high risks of social and cultural disturbance. The applicability of such mechanisms is especially in situations where a governance model has to strike a balance between energy security goals and rights-based protection and energy justice principles.

Brazil: Governance of Hydropower and Constitutional Territorial Rights.

Brazil is a topical comparative reference jurisdiction as it constitutionally acknowledges the Indigenous territorial rights and has had a history of socio-legal challenges over major infrastructure initiatives, such as hydroelectric dams, in forest and river areas. The Federal Constitution of 1988 acknowledges the social

organisation, customs, languages and traditions of Indigenous peoples and establishes their original rights to the lands which were traditionally held by them. The constitutional design also assumes responsibilities on the State in terms of the recognition and protection of Indigenous territories, which indicates the normative stance according to which Indigenous lands are not a mere interest in private property but a place in the constitution that has been associated with cultural survival and community continuity.

However, the constitutional design of Brazil has been put to the test by competing developmental interests and by institutional issues of law regarding the extent of the Indigenous territorial claim. An important modern debate is the so-called "Marco Temporal" thesis, which tries to restrict the recognition of Indigenous land to areas physically occupied at the moment of promulgation of the Constitution in 1988. Historical displacement and forced displacement have been criticised as falling outside the view of this doctrine and it has been argued that it may justify dispossession by loading formalistic proof burdens. In its jurisprudence and legal argument, the Supreme Federal Court has found the "Marco Temporal" criterion to be unconstitutional and the legislative debate has been dynamic in regard to the reintroduction of limiting thresholds.

Concerning the governance of hydropower, Brazil points out one key socio-legal observation, which is that even with constitutional recognition, structural harm can still occur unless supplemented by viable consultation procedures, enforceable institutional protective measures and remedies with the ability to ensure no culture or socioeconomic disturbance is created once it is too late. The norms of the UNDRIP on Free, Prior and Informed Consent confirm that Indigenous communities are not to be relocated or severely disturbed without their meaningful participatory engagement. In the Brazilian context of development, hydro-power struggles are examples of how the authorisation of energy infrastructures may result in in-depth opposition where consultation is fractional and incomplete and where reimbursement regimes cannot accommodate the loss of culture or community disintegration and loss of Indigenous life-ways.

In the case of Malaysia, Brazil has lessons regarding reforms that are cognizant of the fragility of Indigenous protection when administrative and developmental concerns prevail in governance. The comparative value is that the recognition of rights is to be institutionalised by enforceable regulations on consultation, demarcation, protection and access to effective remedies. In this respect, the experience of Brazil supplements the Canadian doctrine of procedural consultation by proving that Indigenous protection systems should also consider the territorial integrity and historical injustice, mainly when the decision on development may propagate the practice of dispossession via feeble procedural protection mechanisms.

In order to generalise the comparison results and to eliminate a mere description of jurisdiction-by-jurisdiction comparison, the significant protections monitored in Malaysia, Canada and Brazil are summarised in Table 1. The table brings together the legal foundation of Indigenous rights, the procedural grounds on standards governing consultation and participation, the remedial orientation of each model and the main institutional regulations of enforcement. This comparative review explains the areas of mutuality and differences in jurisdictions. It offers an ordered platform for determining reform priorities that can empower Malaysia to bolster its hydropower governance, such that it is in tandem with energy justice and the sustainable development pledge.

Table 1: Comparative safeguards for Indigenous peoples in hydropower governance (Malaysia, Canada, Brazil)

Comparative element	**Malaysia**	**Canada**	**Brazil**
Legal source of Indigenous rights	Statutory framework (including Aboriginal Peoples Act 1954) + judicial recognition of customary rights (e.g., *Adong*, *Sagong Tasi*)	Constitution Act 1982, s 35 recognises and affirms Aboriginal and treaty rights	1988 Federal Constitution (Arts 231–232) recognises original rights over traditional lands

Core procedural safeguard	Primarily administrative and compensation-centred, consultation standards are not firmly structured in dam approvals.	Duty to consult and accommodate triggered by Crown knowledge + contemplated adverse impact	Constitutional protection + demarcation obligations; consultation contested in practice
Consent/consultation benchmark	No explicit FPIC-type statutory requirement across hydropower approvals	Meaningful consultation required; depth proportionate to claim strength & impact (*Haida*)	FPIC norm reflected through rights discourse; constitutional principles oppose restrictive land recognition
Remedy orientation	Compensation dominant; limited prevention of structural harm	Preventative governance: consultation occurs before final proof of rights; accommodation may alter state action	Constitutional and judicial contestation can restrain restrictive doctrines; remedies are often tied to territory recognition.
Enforcement institution	Courts provide key recognition; regulatory/administrative mechanisms are less explicit.	Courts strongly operationalise consultation duties; administrative bodies are increasingly structured.	The Supreme Federal Court is central in constitutional interpretation; political contestation remains significant.
Main weakness highlighted	Safeguards are insufficiently preventative; cultural loss is not adequately recognised.	Consultation is not always equivalent to consent; implementation varies across projects.	Rights recognition vulnerable to political/legal pushback; procedural compliance may be uneven

CONCLUSION

This paper has discussed the socioeconomic and cultural effects of hydroelectric dams on the Indigenous peoples using a Malaysian legal lens. It is backed up by comparative observations of reform relevance in Canada and Brazil. The discussion reveals that despite the rampant advancement of hydropower as a shift towards renewable energy in Malaysia, the management of mega-dams has continued to subject the Indigenous people to displacement, livelihood upheaval, loss of traditional land and river access and cultural displacement. These effects demonstrate one gap in a long-running absence of planning hydropower development that is based on the rights and protection of the rights and welfare of Indigenous people and their culture.

The results show that the Malaysian regulatory reaction is still more compensation-focused and inadequate, where the damage is not limited to the measurable economic harm. Even though the Malaysian courts have identified customary interests in the landmark case of Adong bin Kuwau and Sagong bin Tasi, a judicial recognition will never be enough to ensure that the hydropower projects are materialised in their implementation unless it is incorporated in the administrative and regulatory processes that the hydro projects are approved. Unless there are systematic procedural protections, the interests of Indigenous people face a risk of being trampled at the very levels where the decisions which have the most excellent determinative power are being made and where the damage is irreversible.

Relative to Canada and Brazil, the analysis confirms that sustainable hydro-power governance demands

preventative legal instruments as opposed to the use of post-hoc solace. Canada demonstrates how Indigenous participation can be implemented by using enforceable consultation responsibilities, which are scaled depending on the severity of the expected impacts. Brazil emphasises the need to safeguard territorial integrity and oppose legal doctrines that could become normalising of dispensation, without showing that institutional protection could not be adequate only through constitutional recognition. All these jurisdictions indicate that procedural fairness, meaningful participation and enforceable standards of protection are becoming increasingly important in establishing the legitimacy of resource development.

This article, therefore, argues that Malaysia should tighten controls over hydropower by instituting reforms that institutionalise the responsibilities of consultation in the dam approval exercise, enhance safeguarding of customary tenure and acknowledgement of non-economic harms, such as the loss of culture and disintegration of communities. The inclusion of Indigenous protective measures in renewable energy regulation does not conflict with the objectives of decarbonisation; on the contrary, these measures are necessary to make sure that the energy transition in Malaysia will become socially acceptable and aligned with the requirements of sustainable development. In the end, the renewable energy policy should not be based on the principles of justice and sustainable development at the cost of the rights, dignity and cultural survival of Indigenous people, who should be given the right to develop hydropower.

Further studies are necessary to further this doctrinal-comparative study by research considering community-based research and stakeholder interviews to investigate how consultation, compensation and resettlement work out in the field of hydropower development in Malaysian projects. Additional research can also assess the ways of integration of rights-based protection, such as institutionalised consultation obligations and culturally sensitive impact evaluations, into the Malaysian renewable energy regulation without jeopardising energy security goals. This kind of research would enhance evidence-based reform and promote a more socially legitimate and justice-based hydropower transition.

ACKNOWLEDGEMENT

This publication stems from a group project undertaken by students of the Faculty of Law, Universiti Teknologi MARA (UiTM) and we gratefully acknowledge their collective effort, research commitment and dedication in developing the foundational analysis that shaped this work. We also extend our appreciation to the Faculty of Law, UiTM, for providing an enriching academic environment that fosters rigorous inquiry and meaningful engagement with real-world issues concerning hydropower development, Indigenous land rights and sustainable energy governance. Finally, we acknowledge the valuable industrial linkages supporting this publication, particularly the contribution of A. Razak & Co. PLT and its Managing Partner, Dato' Abd Razak, in the publication of this article.

Disclosure of AI Assistance

This manuscript was prepared with the support of artificial intelligence tools, which were used solely to assist with drafting, editing and language refinement. All intellectual content, scholarly analysis, interpretation and conclusions presented in this work are the original work of the authors. The use of AI tools was transparent, supervised and did not contribute to the generation of original research data or substantive intellectual content.

REFERENCES

1. Aboriginal Peoples Act 1954 (Revised 1974) (Malaysia).
2. Adong bin Kuwau & Ors v. Kerajaan Negeri Johor & Anor [1997] 1 MLJ 418 (HC).
3. American Rivers. (2021, February 9). *The future of hydropower*. https://www.americanrivers.org/threats-solutions/energy-development/hydropower-climate-change/
4. Aspinwall, N. (2020, January 19). China-backed dam threatens Indigenous people in the Philippines. *Al Jazeera*. https://www.aljazeera.com/news/2020/1/19/china-backed-dam-threatens-indigenous-people-in-the-philippines
5. Berga, L. (2016). The role of hydropower in climate change mitigation and adaptation: A review. *Engineering, 2*(3), 313–318. https://doi.org/10.1016/j.eng.2016.03.004

6. Berkun, M. (2010). Hydroelectric potential and environmental effects of multi-dam hydropower projects in Turkey. *Energy for Sustainable Development, 14*(4), 320–329. https://doi.org/10.1016/j.esd.2010.09.003
7. Brazil: Reject anti-Indigenous rights bill. (2021, August 25). *Human Rights Watch*. https://www.hrw.org/news/2021/08/24/brazil-reject-anti-indigenous-rights-bill
8. Canadian Energy Regulator Act, S.C. 2019, c. 28, s. 10 (Canada).
9. Cernea, M. M. (2004). *Social impacts and social risks in hydropower programs: Preemptive planning and counter-risk measures*. United Nations Symposium on Hydropower and Sustainable Development. https://www.un.org/esa/sustdev/sdissues/energy/op/hydro_cernea_social%20impacts_backgroundpaper.pdf
10. Climate Action. (2018, November 6). New research finds hydropower dams unsustainable in the developing world. https://www.climateaction.org/news/new-research-finds-hydropower-dams-unsustainable-in-the-developing-world
11. Constitution Act, 1982, being Schedule B to the Canada Act 1982 (UK), 1982, c. 11, s. 35.
12. Cooke, F. M., Nordensvard, J., Saat, G. B., Urban, F., & Siciliano, G. (2017). The limits of social protection: The case of hydropower dams and Indigenous peoples' land. *Asia & the Pacific Policy Studies, 4*, 437–450. https://doi.org/10.1002/app5.187
13. FMT Reporters. (2021, March 22). Orang Asli bantah bina empangan Nenggiri di Gua Musang. *Free Malaysia Today*. https://www.freemalaysiatoday.com/category/bahasa/tempatan/2021/03/22/orang-asli-bantah-bina-empangan-nenggiri-di-gua-musang/
14. Government of Malaysia. (2011). *Renewable Energy Act 2011 (Act 725)*. Laws of Malaysia.
15. Gwynne, M. (2018). The debate over dams. *Viterbi Conversations in Ethics*. https://vce.usc.edu/volume-2-issue-1/the-debate-over-dams/
16. Haida Nation v. British Columbia (Minister of Forests), 2004 SCC 73, [2004] 3 S.C.R. 511 (Canada).
17. Harris, M., & da Silva, D. F. (2021, June 29). The war on Indigenous rights in Brazil is intensifying. *openDemocracy*. https://www.opendemocracy.net/en/democraciaabierta/the-war-on-indigenous-rights-in-brazil-is-intensifying/
18. Human Rights Commission of Malaysia (SUHAKAM). (2013). *Report of the National Inquiry into the Land Rights of Indigenous Peoples*. https://suhakam.org.my/wp-content/uploads/2023/11/NI.pdf
19. Hunt, J. D., Nascimento, A., ten Caten, C. S., Tomé, F. M. C., Schneider, P. S., Thomazoni, A. L. R., de Castro, N. J., Brandão, R., de Freitas, M. A. V., Martini, J. S. C., Ramos, D. S., & Senne, R. (2022). Energy crisis in Brazil: Impact of hydropower reservoir level on the river flow. *Energy, 239*, 121927. https://doi.org/10.1016/j.energy.2021.121927
20. International Hydropower Association. (2021). *2021 hydropower status report*. https://www.hydropower.org/status-report
21. International Institute for Applied Systems Analysis. (2021, September 21). To solve Brazil's energy and food crisis: Store more water. https://previous.iiasa.ac.at/web/home/about/210921-how-to-solve-brazils-energy-crisis.html
22. International Labour Organization. (2025). Ratifications of C169 – Indigenous and Tribal Peoples Convention, 1989 (No. 169). *ILO NORMLEX*. https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11300:0::NO:11300:P11300_INSTRUMENT_ID:312314
23. Moran, E. F., Lopez, M. C., Moore, N., Müller, N., & Hyndman, D. W. (2018). Sustainable hydropower in the 21st century. *Proceedings of the National Academy of Sciences, 115*(47), 11891–11898. https://doi.org/10.1073/pnas.1809426115
24. MyGOV. (2020). *The Government of Malaysia's official portal*. https://www.malaysia.gov.my/portal/content/31186
25. National Geographic Society. (2019, May 31). *Hydroelectric energy*. https://www.nationalgeographic.org/encyclopedia/hydroelectric-energy/
26. Natural Resources Canada. (2025, December 19). *Public consultations and engagements*. Government of Canada. https://natural-resources.canada.ca/corporate/transparency/public-consultations-engagements
27. Oakes, K. (2019, February 11). How we can save hydropower. *Technologist*. https://www.technologist.eu/how-we-can-save-hydropower/

28. Office of Energy Efficiency and Renewable Energy. (2020). *Types of hydropower plants*. Water Power Technologies Office. https://www.energy.gov/eere/water/types-hydropower-plants
29. Oh, T. H., Lalchand, G., & Chua, S. C. (2014). Juggling act of electricity demand and supply in Peninsular Malaysia: Energy efficiency, renewable energy or nuclear? *Renewable and Sustainable Energy Reviews, 37*, 809–821. https://doi.org/10.1016/j.rser.2014.05.070
30. Parker, L. (2017). See a massive dam's significant impacts on tribal communities. *National Geographic*. https://www.nationalgeographic.com/photography/article/omo-dam-ethiopia-kenya-photographs
31. Rahman, S. (2020). *Renewable energy: Malaysia's climate change solution or placebo?* ISEAS Publishing.
32. Romich, E., Civittolo, D., & Bowen, N. (2016, June 23). Characteristics of a boomtown. *Ohioline, The Ohio State University Extension*. https://ohioline.osu.edu/factsheet/cdfs-sed-2
33. Ronayne, M. (2005). *The cultural and environmental impact of large dams in Southeast Turkey: Fact-finding mission report*. https://www.rivernet.org/turquie/pdfetdocs/turkeydams.pdf
34. Sagong bin Tasi & Ors v. Kerajaan Negeri Selangor & Ors [2002] 2 MLJ 591 (HC).
35. Sahabat Alam Malaysia. (2021, November 15). Indigenous customary land rights and the modern legal system (Part 3: Systemic violations require system change). *Friends of the Earth Malaysia*. https://foe-malaysia.org/articles/indigenous-customary-land-rights-and-the-modern-legal-system-3/
36. Savic, K., & Hoicka, C. E. (2023). Indigenous legal forms and governance structures in renewable energy development: A review and analysis. *Utilities Policy, 84*, 101626. https://doi.org/10.1016/j.jup.2023.101626
37. Soukhaphon, A., Baird, I. G., & Hogan, Z. S. (2021). The impacts of hydropower dams in the Mekong River Basin: A review. *Water, 13*(3), 265. https://doi.org/10.3390/w13030265
38. Supremo Tribunal Federal. (2023, September 21). STF concludes judgment on marco temporal for demarcation of Indigenous lands [News release]. https://portal.stf.jus.br/noticias/verNoticiaDetalhe.asp?idConteudo=514552&ori=1
39. Survival International. (2019, November 28). *Belo Monte dam*. https://www.survivalinternational.org/about/belo-monte-dam
40. Sustainable Energy Development Authority Malaysia. (2018). *SEDA Malaysia annual report 2017*. https://www.seda.gov.my/
41. Sustainable Energy Development Authority Malaysia. (2009). *National Renewable Energy Policy*. https://www.seda.gov.my/policies/national-renewable-energy-policy-and-action-plan-2009/
42. Swainson, L. (2008). Compensating for development: Orang Asli experiences of Malaysia's Sungai Selangor dam. *Asia Pacific Viewpoint, 49*(2), 155–168. https://doi.org/10.1111/j.1467-8373.2008.00367.x