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A SOCIO LEGAL STUDY OF THE IMPACT OF CLIMATE CHANGE: A CASE STUDY OF PAKISTAN

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ABSTRACT

Scientists recognize climate change as the inevitable natural occurrence which transcends mythological status. Scientific records demonstrate that South Asia faces a new significant environmental challenge known as climate change which affects Pakistan to a similar degree. This research article investigates the dangers and environmental impacts which climate change brings to South Asia with specific focus on Pakistan. The research investigates environmental reaction, social and economic aspects of recent flooding to understand why the region faces higher climate change responsibility and analyze present-day management solutions for environmental protection. Through analysis this research aims to detect both research-based and policy-related gaps that mainly exist in environmental funding and Sustainable Development Goals (SDGs). The recent disastrous flooding happened in July and September 2022 primarily because of present weather patterns involving glacial degeneration and glacier lake outburst floods (GLOFs) and intense monsoon rain amounts. The population of Pakistan experiences significant climate change effects while Pakistan generates only minimal global greenhouse gas emissions volume. The situation continues to decline as a result of fast industrial development and fossil fuels and plastic materials and tree-cutting practices. The study proves that reservoir management combined with dam development presents dual advantages that both protect ecosystems along with lowering flood frequency. The text emphasizes the necessity to add climate policies within socio-

	economic and political structures that lead to sustainable environmental results. A comprehensive coordinated approach to climate agreements in South Asia should be developed according to this research. States should take climate change prevention measures along with supporting sustainable development practices and creative adaptations while establishing international partnerships to create a strong sustainable world. The research shows that funding climate and water research at higher levels should be increased simultaneously with developing innovative flood risk mitigation approaches by integrating knowledge from various research fields. Alignment with the Sustainable Development Goals and solutions targeting climate injustice at its root cause will enhance political strategies and their outcome results.

INTRODUCTION

Technology reached its peak accessibility in human lives through the period spanning from the 16th to 18th centuries. The period has gained its name as development during the "scientific evolution or enlightenment" stage which brought numerous new inventions. Industrialization labor allows better hand-to-hand labor possibilities while providing proof of workforce potential. It has received access from facilities but this has caused damage to the environment and the earth's condition. One needs to understand weather patterns first along with their alterations to explore the earth's environmental factors. Atmospheric changes involving temperature movements and weather patterns throughout extended periods are defined as "climate change." Natural environmental processes can trigger such changes but human-produced GHGs have become the dominant cause of global warming. Global warming has minimal GHG emissions from Pakistani sources but the nation experiences higher sensitivity to its environmental effects. The Climate Rate Index ranks Pakistan persistently as one of its ten most susceptible nations. The government faces severe implications from climate change dangers in Pakistan after it occurs (Adnan, Baohua, Shaheen, Peiwen, Peng and Haiyan, 2024). The international climate crisis affects Pakistan without any exceptions. The country experiences this serious condition as one of its major adversities. Global warming affects human vulnerability and creates different impacts on social communities based on their economic status and livelihoods during the evaluation process. Scientists from around the world unanimously confirm that global warming already occurs with unavoidable consequences that could include severe food shortages together with property

displacement and water shortages and economic destruction and species extinction (Adnan, Baohua, Shaheen, Peiwen, Peng and Haiyan, 2024). Pakistan stands as one of the most exposed countries to both gradual and sudden climate transformations. Future generations will face important scientific, economic and social as well as ethical concerns about the preservation of the Earth in its original state. Environmental changes generate substantial effects on worldwide human migration which intensify as these changes enter areas affected by economic forces, political structures and social systems. Global warming caused multiple devastating floods to hit Pakistan since the previous decades. The vulnerability to flooding exists at the same level throughout developed and developing countries. Urban floods have a major impact on regional growth together with geographical advancement throughout affected regions. Representatives of all human civilizations face death through climate change (Global Climate Risks). The continuous weather pattern changes induced by global warming cause novel effects throughout the entire planet. Scientists observe that the earth now operates at a temperature higher than 1.5 ◦C. Environmentalists predict that rising 2 ◦C in Earth's temperature would lead to extinction of human life on the planet. The excessive GHGs Carbon Dioxide and Methane reflect ambient heat thus leading to earth temperature rise. The combination of heavy flooding with ice sheet melting and heat waves together with droughts and continuous sea level elevation constitutes the effects of global warming. The worldwide spatial analysis of two vulnerability indices has placed Pakistan within the most risky category. The country of Pakistan possesses a surrounding mountainous terrain from east and north and south since glaciers cover most of these regions while the Arabian Sea borders its southern territory. Due to its geographical location and human-made activities Pakistan along with its South Asian neighbors experience higher climate change susceptibility than most other countries demonstrated in recent decades. Almost 150 extreme weather events have occurred in Pakistan between 1998 and 2018. The country has endured damaging floods between 1990 until now. Speed of glacial melting in Pakistan exposes the country to Glacial Lack Outburst Floods (GLOF). Multiple institutions estimate that the recent 2022 flooding has subjected Pakistan to damages worth approximately $30 billion. Floods in 2022 obliterated Pakistan’s agricultural sector which creates the largest portion of its Gross Domestic Product (GDP). The world has built an environmental-saving mechanism to combat climate change effects yet Pakistan needs to contribute additional resources for further efforts.

Discussions

Pakistan stands as the second largest populous nation in South Asian territory while exhibiting dry climate zones with minimal agricultural generating capacity. The country displays climate differences that link to its geographical points which create variations in overall climate patterns. In the winter seasonal period Pakistan experiences very cold temperatures before transforming into hot weather patterns during the summer months. The northern regions of Pakistan are bordered by the Himalayas and the east by Suleiman Mountain together with the lowland plains along the Indus River and the coastal areas in Baluchistan and Sindh. The Indus Basin's complete drainage area consists of 60% within Pakistan's borders. The vulnerable areas mentioned are subject to greater danger of glacial retreat and sea level increases because of climate change affecting Karachi and Baluchistan specifically. The Earth experiences increasing temperatures throughout every year and recent two decades have shown more recurrent water disturbances including floods droughts and cyclones (2007). The majority of these regions exist as arid to semi-arid regions that face additional risks from floods and land-sliding events. Pakistan has 22.8% high-risk exposure zones across its terrain and 49.6% population bases face the worst effects of climate change. The nation faces greater food security threats because its agricultural production remains its primary food source. The repeated flood, water-logged lands, land desertification and increasing pest issues and regular major disasters endanger food security in Pakistan. A 1 degree Celsius temperature increase is projected to diminish wheat yield in Pakistan by 6-9% and it will impact other crops like cotton and mango negatively (Zia, 2014). Climate change impacts the everyday lives of the population at such high levels that Pakistan ranks as one of the ten nations with the severe consequences. Climate change has impacted virtually every South Asian nation with specific emphasis on Pakistan due to hostile climate conditions and diminished living standards of its people. Pakistan ranks as one of the ten countries where outdated countermeasures exist against climate threats while people show limited understanding of climate change consequences. The majority of people in Pakistan, not even considered climate change as a threat to humanity. The existing physical framework within Pakistan remains inadequate for confronting climate-related dangers because of poor infrastructure design that leads to regular strikes from disastrous events including floods and seismic disturbances. The government of Pakistan lacks an organized national strategy using existing identification data of climate threats despite international reports on these risks (Areeja, Taqi, Talha and Neal, 2022). The state of Pakistan's food supply together with energy security and

population well-being remains in an unfavorable condition. The excessive consumption of fossil fuels together with human-generated greenhouse gases by Pakistan serves as the primary reason. Due to its developing state Pakistan possesses limited capability to put adaptive strategies into practice for addressing climate change. The strategies Pakistan needed to implement for combating climate change threats came with an estimated requirement of 7 to 14 billion dollars. To minimize greenhouse gas emissions Pakistan maintains several international agreements with both countries and United Nations entities. The future impacts of climate change worry world authorities so they developed various approaches to combat climate change's adverse effects. Almost every leader together with governmental representatives and organizations participate at United Nations Climate Change Conference (COP-26) to tackle climate change and global warming. All participants at this conference aimed to secure commitments about sustainable progression under the Paris Agreement and UN framework convention on climate change through an overall global temperature drop to 1.5oC below pre-industrial levels (COP-26, 2021). The IPCC made predictions in 2018 stating the world would reach complete zero emissions by 2050 while maintaining sustainable temperature levels. The U.S. Treasury Secretary Janet Yellen emphasized at the conference that "The challenge requires us to revolutionize our carbon-intensive economic structure because climate change solutions present the biggest economic benefits of modern times." The human population in Pakistan has suffered multiple adverse health effects due to climate change. The 2022 flood wave has produced negative consequences for social well-being and economic factors as well as emotional state of Pakistani citizens (Areeja, Taqi, Talha and Neal, 2022).

Global and Domestic Perspective

The Paris Agreement demonstrated Pakistan’s legislative shortage when it was ratified during November 2016. The international climate related system demands domestic legislation for proper support at national and international levels (Joseph and William, 2014). Through the CCA Pakistan established its position as a nation that recognizes climate change as an important matter. At the United Nations General Assembly Maleeha Lodhi presented Pakistan’s instrument of ratification which made Pakistan the 104th nation to join the treaty. The approval of the treaty by Pakistan occurred after India's approval and Pakistan ratified this accord during 2002. The global legislation required Pakistan to join India for geopolitical image creation purposes therefore Islamabad adopted a pattern of reactive policy development (Sarim, 2019). Despite being snapped up as an

international relations PR opportunity the CCA was needed in reality and not solely for treaty requirements or geopolitical reasons. A study conducted by Gallup in 2008 indicated that Pakistanis had minimal knowledge about climate change issues as only 34% knew about them and only 24% recognized it as a serious threat (Foreign Policy, 2018). The CCA served as a platform to illuminate the primary origin of national crises which affected Pakistan during the previous years with 18 million people pushed from their homes by climate-induced floods. The regions of Balochistan and Thar experienced drought conditions during which 2014 and 2015 showed minimal rainfall. The area now lacks sufficient water to fulfill its dietary needs because of this phenomenon. During 2015 Karachi lost over 1000 people as a result of the heatwave that afflicted the nation's leading economic center. Research conducted in 2015 by Gallup demonstrated that Pakistan appeared among 19 nations whose people viewed climate change as a substantial menace to their national welfare. The critical need at this moment was to establish a contemporary scientific legislative policy designating significant technological priorities for urgent investment because Pakistan faced water depletion until 2025 (Relief Web, 2018). Another vital point to consider involves the position of the CCA relative to the 18th constitutional amendment while dealing with international agreements and national demands. Under the 18th amendment to the Constitution states received legal power to make decisions about climate change along with other matters. The CCA established a federal ministry that received funds from the center while managing its responsibilities against the spirit of constitutional changes that should have empowered district commissioners and provincial governments in their jurisdictions. When the district commissioners were given their ideal authority they could have successfully eliminated the delays and obstacles within the supply chain. Because the actors who deal directly with specific problems can better execute policies once they are properly mandated through laws. The constitutional amendment needed substantial restructuring to modify both federal structure policies and political mindset adjustments of legislative members.

Analysis of the CCA 2017

The three institutions established through the Act include Pakistan Climate Change Council as well as Pakistan Climate Change Authority and Pakistan Climate Change Fund. The article examine if procedural rules of these institutions hold reasonable standards and review their authorities along with their effectiveness in policy analysis and societal impact to confirm if future policies under the Act represent the key stakeholders (Sarim, 2019).

Pakistan Climate Change Council

The Pakistan Climate Change Council abbreviated as PCCC is the policy-making institution in climate change matters in Pakistan and was established by the Pakistan Climate Change Act of 2017. It is headed by the Prime Minister where members of federal and provincial ministers as well as the chief secretaries; non-official members are up to thirty of which include scientific personnel, environmental specialists, representatives from the chambers of commerce and civil society. The Council's key responsibilities include the oversight of climate change legislation and measures, the supervision of the compliance with the climate change conventions, and the support of climate change planning and regulation at the national and provincial level. The government body not only monitors the implementation of the adaptation and mitigation strategies, plans, and projects into practice required for the country to meet its commitments of the international conventions, Sustainable Development Goals (SDGs). However, it is also involved in the scrutiny of the National Adaptation Plan including that of the provinces, and the National Appropriate Mitigation Action Framework. It also endorses the stewardship regulations for endangered endemic biological species and other non-renewable sources of production that has been influenced by climate change. Altogether, the PCCC can be seen as the coordinating and leading body that is responsible for ensuring that Pakistani climate polices are properly coordinated and consistent with both the national interest and the country's international obligations (UNEP, 2017).

Pakistan Climate Change Authority

Pursuant to Section 5 (2)30, Pakistan Climate Change Authority (PCCA) emerges as a corporate body that enables legal suit participation while actively initiating suo moto cases to secure assets through borrowings and execute necessary contracts (Sec. 5 (2) 30, 2017 PCCA). Pakistan benefits from creating a corporate body through its climate regime because this specific entity exercises responsibility for managing climate-related disasters and implementing preventive measures. This action will lead Pakistan toward following global practices of climate change litigation conducted within court systems. The establishment of this corporate body will enable affected parties to obtain needed compensation which they previously lacked due to state negligence regarding climate-related policies.

Under section 8 the authoritative body receives its defined purpose. The core responsibilities of the authority involve developing mitigation measures along with programs that stop climate change from worsening in Pakistani territory (Sec. 8, 2017 PCCA). The PCCA bears responsibility

for the Paris Agreement implementation process by creating a system to deliver the Nationally Determined Contributions to the UN Framework Convention on Climate through this joint commission. Upper Pakistan Climate Change Council members cannot validate the technical information and findings about Nationally Determined Contributions since they lack checking authority from PCCA. The authority handles these duties through sections 8(e) to (u) which outline their research development responsibilities and their requirement to run effective market campaigns intended for public education (Sec. 8 (e) – (u), 2017 PCCA). Conferring powers to PCCA happens through section 10 together with the intentions specified in the PCCA activities and plans. The PCCA obtains power to build private-public alliances through section (10) (2) (b). The provision allows partnerships between organizations or governments of foreign regions through government executive permissions (Sec. (10) (2) (b), 2017 PCCA). A significant problem exists because bureaucratic obstacles in managing climate change emergencies can potentially create operational slowdowns for the organization. The bureaucratic lag in this case worsens because of disregard for both the provincial devolution of 18th amendment and its accompanying legislation. Several foreign development organizations operating throughout different provinces face hurdles in the organization's acquisition of partnership agreements. A devolved corporate organizational structure with different branches spread across the federation would have resolved this issue since the single centralized Authority office in Islamabad posed a challenge. The Authority plans to construct multiple new branches that will become operational upon demand but their establishment will extend across time.

Pakistan Climate Change Fund

Under Section 12 the PCCA requires its own climate change fund as its financial foundation to perform its duties (Sec. 12, 2017 PCCA). The provision at Section (12) (2)37 allows funds from donations, endowments, grants and gifts to constitute the pool for the fund's financial resources (Sec. 12 (2) 37, 2017 PCCA). The relationship between section (12) (b) needs examination considering the government's higher officials must grant clearance under section (10) (2) (b) regarding foreign-based aid received from organizations and governments (Sec. 10 (2) (b), 2017 PCCA). The primary developmental project funding originates from foreign contributions and encounters bureaucratic slowdowns because of its international nature.

Conclusion

Climate change exists as an unprecedented and uncertain reality with unpredictable outcomes that produce new kinds of threats which decision makers are unaccustomed to solve. The regions with existing security risks (political, strategic, economic and security-level) face the most significant exposure to climate change effects because of domestic and international instabilities and Pakistan belongs to this vulnerable category. The urgent need exists for outside-the-box solutions along with proactive policy measures because coping with climate change properly requires the least destruction even if destruction becomes unavoidable. Pakistan currently faces Climate Injustice at the highest level of environmental vulnerability. Climate injustice demands both well-designed nationwide policy execution and complete agreement between political leadership and environmental experts and state institutions and civil society members regarding protecting future generations from climate change threats. The urgent and severe nature of this problem makes it necessary for our generation to take dramatic measures like wartime readiness because future generations will never forgive us for environmental destruction and state government failures. The extensive neglect requires both worldwide collective solutions and original innovative approaches because this negligence meets the criteria of criminal form. A single state cannot address this environmental issue since it involves every individual on Earth who must unite for substantial positive results. Human greed alongside unchecked industrialization together with resource waste and scientific experiments and hazardous material disposal and uncontrolled urbanization and forest destruction resulted in equilibrium imbalance through plant and animal destabilization. The time demands an immediate end to climate destruction which people justify through modernization together with technology. The urgent requirement exists for climate-friendly architecture along with machinery and technology to stop additional environmental deterioration (Dawn, 2018).

Pakistan faces higher rates of urbanization while adopting non-environmental technologies so necessary policies need implementation to stop green land development for 'life style' residential projects. Our current behavior leads to suicide as well as death for the generations that follow us. Disasters involving water scarcity coupled with plant shortages along with prominent heat waves and environmental dangers pose greater perils to Pakistan than the enemies situated beyond its national borders. The climate variation pattern afflicting Pakistan demands complete resource management through appropriate climatic measures and proper resource evaluation for protection. Data dissemination both locally and internationally among all stakeholders serves as the essential

factor to reduce damage and minimize losses. The moment has arrived which may amount to never before for Pakistan to face its climate injustice predicament (Sarim, 2019).

Recommendations

- **Enactment of a Unified Climate Change Framework Law**

  Many sectors and ministries in Pakistan continue to operate independently for climate change response. Legislative authorities should introduce a unified Climate Change Act that uses the present Climate Change Policy as its base to establish mandatory legal guidelines for climate adaptation along with mitigation and disaster relief measures and climate justice procedures. A clear definition of responsibilities should be established within this law for all levels of government including federal, provincial and local authorities according to the 18th Constitutional Amendment provisions.

- **Incorporation of Climate Justice Principles**

  Climate justice needs to have constitutional recognition by the legal system. The integration of three environmental principles called intergenerational equity along with polluter-pays and right to a healthy environment must be established within Pakistani legal codes. Judicial precedent, such as the Leghari v. The Federal Government should transform the precedent from the Leghari v. Federation of Pakistan case into official regulations that prioritize the most vulnerable communities in climate resilience decision-making.

- **Strengthening Environmental Laws and Enforcement**

  The Pakistan Environmental Protection Act (PEPA) of 1997 requires modification of present environmental regulations to address modern climate-related risks. Enhanced enforcement capacity requires multiple actions including strengthening of EPAs with additional resources and autonomous power from the judicial system. Environmental violations requiring strong penalties should carry higher fines and their enforcement should happen exactly as written by law.

- **Decentralized Climate Governance**

  Local communities must exercise authority when implementing approaches to adapt to climate change despite federal leadership being beneficial. Local governments should create Climate Change departments which obtain both power and capabilities to carry out tailored climate action strategies at the local level. Local disaster management authorities operating at district level require improved resources and training to handle an increasing number of natural disasters that result from climate change such as floods and heatwaves.

- **Data-Driven Policy Making**

  Reliable collection together with publishing of climate data stands at the core of effective operation. Academic institutions should join forces with the Pakistan Meteorological Department (PMD) and National Disaster Management Authority (NDMA) to build forecasting models and danger warning networks for drought patterns and glacier dissolution along with monsoon shift trends. This accessible climate data enables communities together with NGOs and private stakeholders to take part in climate response initiatives.

- **Inter-Ministerial and Cross-Sectoral Coordination**

  The response to climate change demands coordinated policies among agricultural, hydrometeorological, energy and public health departments. The National Climate Council led by the Prime Minister needs to become the central coordination body which combines officials from all relevant government ministries and provincial governments alongside representatives from civil society organizations and academia to track Pakistan's international commitments especially within the Paris Agreement framework.

- **Climate Education and Awareness Campaigns**

  The level of climate literacy in Pakistan stands low particularly among rural populations. Primary schools should use climate science lessons with sustainability education content according to the Ministry of Education. The national public through radio and TV broadcasts and social media channels must receive education about sustainable actions and emergency preparation approaches and government programs offering assistance in climate crises.

- **Promotion of Green Technologies and Jobs**

  The country needs to allocate funds for developing sustainable infrastructure through renewable power solutions including wind and sunlight and water-powered systems as well as ecological farming techniques and build houses that withstand climate change effects. The adoption of environmental friendly practices should receive financial support from legal incentives including tax breaks and subsidies. The youth can obtain training for upcoming eco-friendly job opportunities through vocational programs that benefit economic progress while supporting environmental sustainability.

Bibliography

- Afzaal, Muhammad, Muhammad Athar Haroon, and Qamarul Zaman. "Interdecadal oscillations and the warming trend in the area-weighted annual mean temperature of Pakistan." Pakistan Journal of Meteorology 6, no. 11 (2009): 13-19.
- Ali, Shaukat, Alia Saeed, Rida Sehar Kiani, Sher Muhammad, Firdos Khan, Romaisa Babar, Asif Khan et al. "Future climatic changes, extreme events, related uncertainties, and policy recommendations in the Hindu Kush sub-regions of Pakistan." Theoretical and Applied Climatology 143 (2021): 193-209.
- Ali, Uzair, Wang Jing, Jialin Zhu, Zhibek Omarkhanova, Shah Fahad, Zhanar Nurgazina, and Zaid Ashiq Khan. "Climate change impacts on agriculture sector: A case study of Pakistan." Ciência Rural 51 (2021): e20200110.
- Anderson, Kevin, and Alice Bows. "Reframing the climate change challenge in light of post-2000 emission trends." Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 366, no. 1882 (2008): 3863-3882.
- Byravan, Sujatha, and Sudhir Chella Rajan. "The social impacts of climate change in South Asia." Journal of Migration and Refugee Issues, Vol 5, no. 3 (2009): 134-147.
- Change, Climate. "Climate change impacts, adaptation and vulnerability." Science of the Total Environment 326, no. 1-3 (2007): 95-112.
- Fahad, Shah, and Jianling Wang. "Climate change, vulnerability, and its impacts in rural Pakistan: a review." Environmental Science and Pollution Research 27 (2020): 1334-1338.
- Farooqi, Anjum Bari, Azmat Hayat Khan, and Hazrat Mir. "Climate change perspective in Pakistan." Pakistan Journal of Meteorology 2, no. 3 (2005).
- Hussain, Mudassar, Abdul Rahman Butt, Faiza Uzma, Rafay Ahmed, Samina Irshad, Abdul Rehman, and Balal Yousaf. "A comprehensive review of climate change impacts, adaptation, and mitigation on environmental and natural calamities in Pakistan." Environmental monitoring and assessment 192 (2020): 1-20.
- Kelkar, Ulka, and Suruchi Bhadwal. "South Asian regional study on climate change impacts and adaptation: implications for human development." Human development report 2008 (2007): 47.
- Kiran, Afifa. "Climate Change: Implications for Pakistan and Way Forward." ISSRA PAPERS 9, no. II (2017).
- McNutt, Marcia. "Climate change impacts." Science 341, no. 6145 (2013): 435-435.

- Mumtaz, Muhammad, Jose Antonio Puppim de Oliveira, and Saleem H. Ali. "Climate change impacts and adaptation in agricultural sector: the case of local responses in Punjab, Pakistan." Climate change and agriculture (2019).
- Mustafa, Zia. "Climate change and its impact with special focus in Pakistan." In Pakistan Engineering Congress, Symposium, vol. 33, p. 290. Lahore, 2011.
- Rasul, Ghulam, and Bashir Ahmad. "Climate change in Pakistan." Pakistan Meteorological Department (2012).
- Rizvi, Aatir, Ahmad Raza Khan, and Muhammad Azeem Farooqi. "A Jurisprudential Study of Climate Change and its Impacts on Pakistan." Pakistan Languages and Humanities Review 6, no. 1 (2022): 168-180.
- Shahid, Fakhara, and Mubeen Adnan. "Climate change: impacts on Pakistan and proposed solutions." Pak. Soc. Sci. Rev 5 (2021): 223-235.
- Shahid, Zareen, and Awais Piracha. "Climate change impacts in Pakistan: awareness and adaptation." The International Journal of Climate Change: Impacts and Responses 2, no. 1 (2010): 119.
- Sivakumar, Mannava VK, and Robert Stefanski. "Climate change in South Asia." Climate change and food security in South Asia (2011): 13-30.
- Tol, Richard SJ, Thomas E. Downing, Onno J. Kuik, and Joel B. Smith. "Distributional aspects of climate change impacts." Global Environmental Change 14, no. 3 (2004): 259-272.
- US Global Change Research Program. Global climate change impacts in the United States. Cambridge University Press, 2009.
- Sarim Jamal, “Examining the Pakistan Climate Change Act 2017 in the Context of the Contemporary International Legal Regime” Lums Law Jornal (2019).