

THE IMPACTs OF HIMALAYAN GLACIERS MELTING TOWARDS NEIGHBOURING NATIONS

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Abstract

The Himalayas is sharing a lot of its diversity and properties with all the nations within the region and other outreach countries through its sources. However, the wellbeing of the region of the Himalayas is currently being threatened by the retreatment of the glaciers in the mountain area and it is worsening each year. The dependency of the countries around the Himalayas on the source originated from the Himalayas glaciers are getting higher and endangering the people down the valley. The natural reaction towards climate change had brought the national security situation to unstable conditions for living thus affecting the vegetation along the glaciermelting path. The objective of this paper is to examine the impacts of melting Himalayan glaciers towards the neighbouring states. The research method used is qualitative, whereby data is derived mainly from secondary sources. All related data are categorised based on the trends and relations with the factors, implications and mitigation actions. The findings of this study are: (1) the melting of glaciers give political, economic and security impacts to the neighbouring countries; and (2) overflow flood and drought are expected to cause immediate and long-term effects. Overall, the holistic plan involving coordination of all nations in the Himalayan region needs to be continued and strengthened by educating down to the lowest level of community.

Keywords: *Economy, Global Warming, Politics, Social, Security, The Himalayan*

The Himalayas could be named as the largest sharing of utility resource for its region. As the largest water reservoir in the world, the Himalayas is being threatened with the potential of losing its most precious gift, the glaciers reserve. The state of ice preserved as glaciers could not hold much longer when those factors such as military activities, global warming and industrialize activities contribute to the rise of temperature are happening, especially within the region. Therefore, in this dedicated paper, particular research and analysis have been conducted to explore the implications of the rapidly melting glaciers in the Himalayas. The implications do not only focus on the water source itself but also the impacts towards other essential aspects such as politics, economy, social, and security. The impacts identified is used to project or forecast the human consequences of global change at some point in the relatively distant future, namely: the future state of the natural environment, the future of the social and economic organisations, the values held by the members of future social groups especially from the regional states in overcoming the situation.

The Impact of Rapidly Melting Glacier

Considering almost all of the factors contributing to the rapid melting of the Himalayas glaciers such as military activities, global warming and industrialize activities, the implications of the glacier's degradation is higher than expected. All the possible impacts are grouped into four categories, which are politics, economy, social, and security. Every factor has its sub impact and could occur when the disaster occurs simultaneously. However, the impact is not going to be happening in two or three years but might take hundred years to see a noticeable difference (Xiang, Li, Zheng, & Xin, 2012).



Map 1.1: The Major River Basins Origin of The Himalayas for The Sustainment of 1.4 billion Population Across Various Nations

Source: <https://link.springer.com/chapter/10> (2019)

Based on the information given from Map 1.1, the countries of the Greater Himalayan Watershed rely on it to supply the abundant amounts of water they need for their large and water-intensive agricultural economies. The Himalayas is a source of freshwater for the communities within the region. The network of rivers connecting almost all parts of the nations originates from the significant rivers named as the Ganges, Padma, Meghna, and Brahmaputra (Whitehead, et al., 2015, p. 1058). These rivers originated from the source of the glacier's basins situated at the top level of the Himalayas contour. The Himalayas has been supplying the glaciers-based freshwater through the rivers and supporting the socio-economy development of Nepal, China, India, Bangladesh, Pakistan and Bhutan since their existence. Therefore, the disturbance to the Himalayas glaciers, which made them melt even faster would implicate the amount of water flowing in the rivers. The difference in the water volume would complicate the regular practice of the local, affecting the socio-economy activities and food security in the region as a whole.

a. political impacts

First of all, before looking into the other sectors' possible impacts of the reclamation of the Glaciers-based Himalayas water source, the priority is given to identify the implication of rapidly melting glaciers towards the nations politically. Here is the list of potential impacts towards politics which include the increment in debt, off-border support required, and state of potential triggering the state of emergency status. The research looked into these implications one by one and how it drives into more complicated problems as well. The impact of the rapid melting of the Himalayas glacier might work as

independent and interrelated from one another, changing the river basin's runoff pattern by happening step by step or concurrent and resulting in loss to human, agriculture, crops, fishing, and industrial sectors in general (Kulkarni, *Glaciers as Source of Water: The Himalaya*, 2014).

i. Increase in Debt

Rapid melting means more glaciers turned into water in time. The first wave came in the form of floods as most of the water in the glacier basin was pouring in doubling the average amount. Looking into the possibility that rivers flooded thousands of hectares, destroying crops, roads, and hundreds of homes, as well as damaging highways, forcing power cuts, and claiming lives, is something that could not be neglected as a catastrophe (Smith, 2014, p. 33). A bigger scale flood is the possibility of happening when the glaciers basin of the Himalayas combined and could not hold the massive volume of water melted due to global warming. This massive flood could submerge an extensive area; moreover, some floods occur abruptly and recede quickly, whereas others take several days or even months to form and recede because of variation in size, duration, and the area affected.

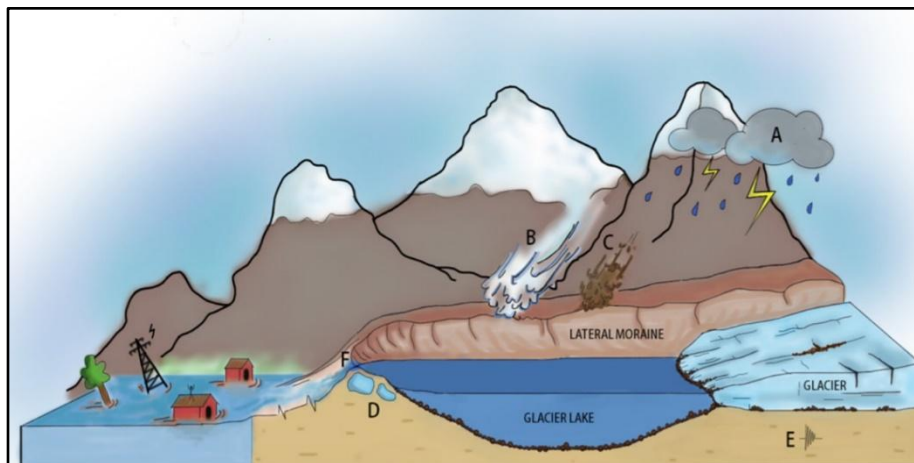


Figure 1.1: The Various Sources of The Glaciers Lake Outburst Flood (GLOF) Endangered The Population and Activities in The Lower Ground

Source: Indian Institute of Science (2018)

Based on Figure 1.1, it has depicted six possible causes of the establishment of the level increment to the glacier lake in the high ranges. The sources are the cloudburst, snow avalanche, landslide, melting of moraine ice, earthquake, and overflow (Kulkarni, Pratibha, Namboodiri, & Kulkarni, 2018, p. 2). The cloudburst is referring to the rain that occurs in the highlands; the droplets become heavy enough that they fall through the air as precipitation (rain, snow, sleet, or hail). Some of this water collects in large, underground reservoirs, but most of it forms rivers and streams that flow into the oceans, bringing the water back to its starting point. This ordinary rain keeps the amount of water or snow adequate to be condensed and turn into glaciers. The snow avalanche happens when the amount of snow accumulated outbursts and is unable to hold its position any longer, whereby flowing towards the lower ground depends on the steepness of the ground. The same thing occurs in the landslide where the soil in the steep high ground is unable to hold position and falls to the low ground. The melt of the moraine ice happens when the temperature is rising and filling the glaciers lake as water. The earthquake happens when the movement of the earth plate occurs and affects the shaking of the glaciers lake's

contents. Therefore, all the reasons that happened threaten the lake to overflow and create an unsteady flow into the stream.

Having a political leader of a political party helming the government, the consideration of putting stability in the situation is a priority. As politicians, the support provides not only referring to the flood victim rescue and assistance but to considers the national losses to bear, whereby sure affects the profit of the country as a whole. The amount of money allocated shows escalation following the expansion of the flood period, not to deny the effect of more losses, which increases the burden of the nation and even the local population to continue their living there afterward. The Government of Nepal, for example, has been spending about Rs 1 million in assisting the flood victims in form of shelters, food, plans for relocations, and other relevant support (Kumar & Saptari, 2019). Come together with the amount of water are the sediments prevention from being transported downstream where it might affect the ecology and productivity of other environments, in particular estuaries, seagrasses, and reefs.

After the end of the flood, with the continuous effect of global warming, the Himalayas absorbed another disaster in-line known as draught. As time goes by, the quantity of water in the glacier basin at the top of the Himalayas is not sufficient, whereby the effect is translated through the reduced amount of water flow in the Himalayas-based river. In severe cases, the shortage of water in the river up to the draught status worried most politicians when the crops were for sure hard to be planted, thus limiting, and scorching planted crops (McDermott, 2009). Therefore, the potential of government borrowing money is high in terms of recovery, since the cost of providing water utility raises high construct.

ii. Required Support

It is not an easy task for a government to handle a disaster by itself. Moreover, the disaster happening because of the shortage of water resulting from the depleted glaciers is very expensive to be brought in. Government initiative in constructing hydropower plants unrealizes when the water flow is low and inadequate, making the existence of the dam costly and complicating the current situation (Schneider, 2009). Therefore, support from all political mediums and government agencies is a need in finding the solution to bring the water back to the scarce location. The politician has no other reason to delay the need for water as it is an essential component of economics and is at the center of economic and social development. Even worse, the disaster sure capable of bringing more hasty effects such as starvation, which straight away became the utmost priority of the political agenda. Therefore, at this moment, any source of help is accepted as it eases the burden carried for survivability.

iii. Emergency State

In some cases, politics cannot effort the disaster from happening. The more difficult situation happens when there is no entity able to provide help because they are receiving the same type of problems whereby depending on the Himalayas water source as the sole source of natural freshwater. At this moment, water is strategically essential; therefore, the usage of the limited resources is controlled by the officials. As the availability of freshwater worsens, the federal government might consider putting the government under a state of emergency in some cases where the water source understands to be shared by two

or more nations (Dixit, 2019). Therefore, all kinds of security forces available in the country are assigned to care for the water reserve available and protect it from being tapped illegally during an alert period.

b. Economy

The way the economist sees the water shortage indicates from the Himalayas-based river is a crucial need in developing the region. Namely, almost all sorts of economic activities conducted in the region of Himalayas are using the Himalayas borne water to water and completing their economy improving requirements (Rasul & Molden, 2019). Therefore, the economic analysts cannot accept the possibility of the Himalayas' freshwater shortage affecting the economy as a whole involving the potential of the industrial shutdown, the decrement in income, and finally, generate to the unemployment problem.

i. Industry Shutdown

Understanding the issue of global warming plus the water scarcity generated by it, the government could not provide an alternative because of the other piece of land also suffering the same implication. On the average time, there are many famous Himalayas-borne rivers with an acceptable amount of water and a steady flow along with the nation's soil. However, without these rivers as support, the industry could not effort to operate efficiently thus increasing the operating cost. As an example, it is difficult to imagine how to crop industry operates without enough water supply in the drought season, then needs to deal with a massive amount of water in the heavy precipitation season (Vaidya, 2015, p. 254).

Table 1.1: Agricultural Area and Water Withdrawal Situation in The Himalayas Region

Country	Value added in agriculture, as a percentage of GDP in 2011	Cultivated area in 2009 ('000 ha)	Proportion of cultivated area equipped for irrigation (%)	Annual agricultural water withdrawal (billion m ³)	Precipitation rate ^a (mm/y)
Afghanistan	31	7910	42 (2002)	20 (1998)	300
Bangladesh	18	8549	60 (2008)	31 (2008)	2700
Bhutan	18	100	28 (2007)	0.3 (2008)	1700
China	10	124,320	48 (2006)	358 (2005)	600
India	17	169,623	39 (2008)	688 (2010)	1100
Myanmar	38	12,135	20 (2004)	30 (2000)	2100
Nepal	37	2,520	47 (2002)	10 (2005)	1300
Pakistan	22	21,280	94 (2008)	172 (2008)	300

Source: UN-ESCAP (2013) and The World Water Assessment Programme (2006)

Referring the Table 1.1, a comparison made by the UN-ESCAP with the assistance of the World Water Assessment Programme in finding the increment in the Gross Domestic Product (GDP) in the regional agricultural sector and its relations to the area involved, the area equipped with the irrigation program, the annual water withdrawal affects and precipitation rate for each region concerned surveyed in 2009. Among the eight nations involved, Myanmar and Nepal received the most significant increment in the GDP, which contributes 38 % and 37 % to their nationals. Among the figures, China and India spend the largest area on cultivation activities; however, Pakistan received almost all of the area irrigated for agriculture. The water withdrawal effect is happening worst in India, and

besides the low precipitation, there is future potential for the agricultural sector in the Himalayas region to receive a negative setback. With the loss because of the spiking operating cost would be difficult to continue operating and return investments, the situation leaves the investors with a very slim option but to shut down the platform or be transferred to other cheaper production areas available. When it is affecting the production cost, the possibility of investors turning to the other country is high, and this kind of act suffers the nation (Partap, 2002). The economy of the country became weak, and more industries' investors turned their back as the effect of climate change decreased the production of some crops, such as rice, soybean, and wheat. Moreover, the changing climate would affect the length and quality of the growing season, and farmers could experience increasing damage to their crops, caused by a rising intensity of droughts, flooding, or fires.

One of the relevant industries is the fishery. The major river derived from the source of the Himalayas is Indus, Ganges, and Brahmaputra, showing that fishing activity is one of the most important to the local economic development. The depth and the width of the river are adequate for much more profitable fishing-related activity, and horticulture has been compromised with the input of sediment into the water, which has been recognized as a potential threat to the wellbeing of aquatic organisms. The forecast on the possible draught to these rivers could destroy the work opportunities which have been done by the locals for ages (Gurung, 2012, p. 71). The inadequate amount of water, which reduced the number of fish available, creates a food security problem. The same thing happens to the agricultural sector, where irrigation suffers the same draught catastrophe destroying the possibility of successful crop harvesting.

ii. **Low-Income**

The research could not agree more that the high-income society came from the prosperity of the nation's economy. Back to the study of the water scarcity resulting in the excessive Himalayas glaciers melt, the state would endanger the economic production is cumulative. It is generally known that low economic drive is an indicator of a low-income nation. The low-income situation could be changed quickly when the stability of the economy could not be controlled anymore. The tendency of investors to fly away to other profitable nations is one of the factors contributing to the low-income generation. These bring to be defined as an inadequate salary and probably add to other complicating problems regarding the cost of living (Dilshad, et al., 2019, p. 24).

iii. **Unemployment**

Another disastrous situation as the economic downturn comes into effect is the increment of unemployment proportional to the population (Apollo, 2017, p. 154). What is going to be happening when the water originated from the glaciers is a shortage and unable to support the industrial requirement. The situation gave a bad sign to the industrial practitioners to retreat and shut down their operations completely. The burden doubled with the effect of many unemployed workers flooding the nations based on either cyclical unemployment caused by the economy being in a recession, or the natural rate of unemployment caused by factors in labor markets, such as government regulations regarding hiring and starting businesses.

c. Social

Understanding the social effect regarding the possibility of effect could happen is vital as the rapid melting of the Himalayas glaciers stays active. Social or the community has the right to respond to the pressure that occurred in the surroundings (Mukherji, Molden, Nepal, Rasul, & Wagnon, 2015, p. 156). The community tends to go against the law when the situation is not favorable to them or imbalance in the easy words. Research here listed three possibilities of impact on society in response to the receding of freshwater origin from the Himalayas glaciers, which are a high number of crimes, poverty, and up to migrations.

i. High Crime

The study says people under pressure tended to break the law; therefore, the possibility created when the draught effect takes action is based on the little amount of water produced by limited Himalayas glaciers. The scarcity impact brought people to the stage of committing such violations, including not paying the amount specified by local water regulations, such as tampering with meters, tapping boreholes without necessary licenses, or installing unauthorized connections to water distribution systems. These unstable situations bring an alert situation not only to the citizen but also to the visitor to consider the purpose of entering the unstable country. Crimes, in forms of protest done by the locals in defending their rights to consume the limited water available because of the retreatment of the glaciers water in their area, and it is affecting the source of power as well (Henry, et al., 2012, p. 118).

ii. Poverty

Another negative impact that happened when dealing with water scarcity of the Himalayas glaciers activity is the issue of poverty. As what has been brought up earlier, the shortage of freshwater had gone too far by expelling most of the industries out of its difficulties consequently enormous unemployment in the surrounding. These jobless citizens had no other choice but to do anything necessary to earn something to continue their living, and it is still below the level of poverty being concerned by the local authority (Wester, Mishra, Mukherji, & Shrestha, 2019, p. 31). Their expertise in different fields could help much with the latest situation; therefore, most of them have to agree to disagree not to be considered as choosy about jobs as most of them are in unskilled or low-skilled jobs, deeming them “overeducated” is just wrong for the continuity of life. The unacceptable situation shows that the probability of being a group in the poverty is high with the difficulty of having water from the source of the glaciers, for sure the economy could not effort giving low price to the daily goods to be sold in the market. People could not effort with the spiking price of groceries which lead to a weak community without the power of buying (Tulachan & Neupane, 1999, p. 71). As time goes by, peasants continue to feed their livestock rather than sell, directly proportional to the difficulties in access to the freshwater source, especially from the Himalayas glaciers.

iii. Migration

These issues do not stop there but living the people in the region agreed with the situation and obeyed all limitations to them even though the request in uprising the quality of life is high. Therefore, some of the affected countries felt the loss of considerable

resources when these people migrate, with the direct benefit accruing to the recipient states who have not forked out the cost of educating them. The intellectuals of any country are some of the most expensive resources because of their training in terms of material cost and time, and most importantly, because of lost opportunity. Migration could be a sensational issue, and these affected countries through a significant number of movements among professionals, which creates difficulty for the nation to redevelop when the situation back to normal or might have happened seasonally (Childs, Craig, Beall, & Basyat, 2014, p. 86). Moreover, the situation of migration continues when other unaffected countries that are offering more benefits in the ordinary occupations or the lower-level jobs could trigger intentions to all citizens in considering a move to a better place. However, not all the locals consider moving out to earn a better living but working and raising families abroad is not an issue of loyalty to the country. The movement made by the citizens is usually not permanent and can return when the situation has been recovering when there is remittance provided by the respective nations affected (Hunzai, 2013).

d. Security

In the world of sovereignty, the issue of security is always the top priority of one nation. Even more important when a claim that normative reasons can be powerful enough to generate a territorial dispute, in some cases even contrary to power-political explanations. When it comes to basic human needs, the requirement of the limited resources, which is the freshwater source of the Himalayas glaciers, turned to the highest priority to be taking care of most. Fighting for limited resources is frequently happening in the world today, and it is not impossible if the dispute arises in terms of fighting for the rights to hold the glaciers water line in their territory. Even when it is not about disputants, there is another security threat involving vector-borne disease outbreaks such as malaria and dengue, which have the potential to exacerbate (Maharaj, Kumar, & Lian, 2014, p. 989).

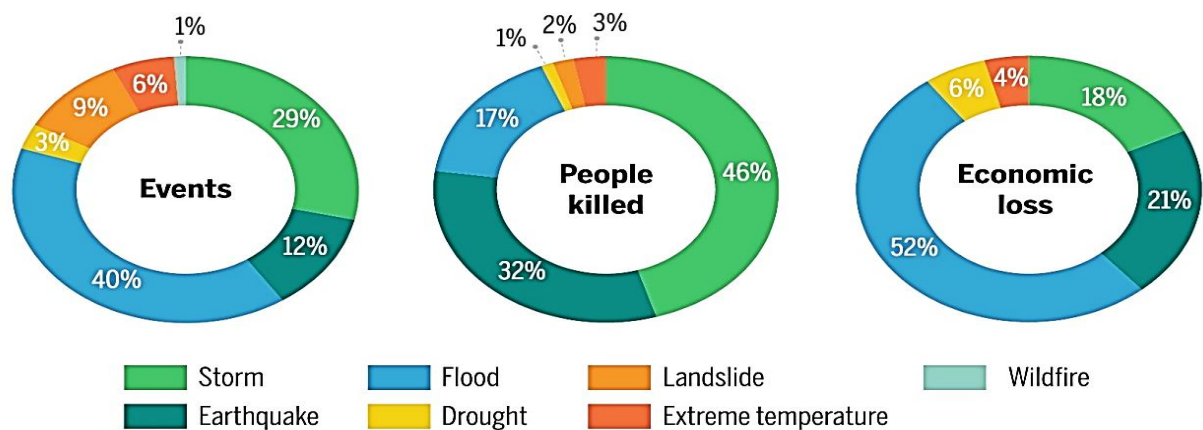


Figure 1.2: The Disaster's Impact in The Himalayas Region According to The Phenomenon in The Period of 1980 To 2015

Source: The Emergency Events Database - Université Catholique de Louvain (2015)

Understanding Figure 1.2 states the complication of climate change towards the disaster that happened from 1980 to 2015 have significant proportionate relations with the

people killed and the economic loss according to specific events calculated. The effect of climate change expressly referred to as the research assessed, is that flood and drought had brought up to 40% and 3% respectively. From the numbers, the proportionate consequence resulted in 17% and 1% death. The most significant impact of the catastrophe is on the economy, whereby 52% was lost because of flood and 6% was lost by drought. These statistical figures are able to be escalated and worried would threaten the community of the Himalayas in the future.

i. Unstable Condition

The world today tends to seek possession of the resources available and is aware of the threat imposed because of the limited possession of the essential life requirement. As an example, Singapore's water usage reaches a demand of about 430 million gallons per day. Of the four taps of supply, imported water from Johor satisfies about 50 percent of the demand, NEWater can meet up to 40 percent, desalination up to 25 percent, and local catchment help to make up the rest to fulfill the essential requirement of the citizens with a population of 5.6 million people. Therefore, the disputation for the scarce resources might tend to bring a "threat multipliers" situation; in this case, it is the linkage between global warming, migrations, and nations disputes, which could create an oppressive unstable situation among citizens (Chugh, 2019).

It might escalate up to the situation where military action involving skirmish or even battle, resulting in lives killed, thus creating more tension between the nations involved. With the escalation of the issue, again, the government spent more on enhancing and intensifying military capabilities to be at par with the bordering states who escalate (Gamble, 2018). Again, the need for economic allotment for the military has been given priority, and the social needs of the local populations fall into second place in priority. This would be translated as to program expansion of the output of the most desired types of nonmilitary goods and services and maintaining full assurance that military needs would be met.

ii. Complicated Border Control

Another implication would happen when the restricted resources occur the problem regarding the cross-border activity conducted by the citizen of the victimized countries. Locally well known that the spatial patterns and processes for immigration were different between each origin and destination country pair. However, with the escalating problems mentioned, it is believed the country expected to receive expatriates on the receiving end would beef up the regulations of entering their countries. Again, on the receiving end countries, also set up some limitations for the expatriates to flow in to ensure the freedom of their citizens and their privilege are not being revoked or insulted (Wester, Mishra, Mukherji, & Shrestha, 2019, p. 391).

iii. Create Inter-Country Tension

When we look back, all the potential impacts are going to happen if the research is focusing on the implication of the security aspect. The unfriendly relations were created among the neighboring nations that shared the same resources and depended solely on the glaciers water source of the Himalayas (McCarthy & Sanchez, 2019). The tension created because of this scarcity not being neutralized since the problems happened, not reaching

any solutions, or agreed to be shared equally. However, these kinds of solutions never being implemented as each nation tried to raise its priority to hold the source as a possessor.

Analysis

Based on the list of critical implications derived after the possible projection of a shortage of the Himalayas glaciers water source, the research tries to find the most significant impact of them all. All the possibilities are gathered based on the past and continuous research up to today by the researchers in collecting data either by physical appearance to the locations affected or by the technology means such as remote sensing and another method of the digital aerial mapping system (Smith, 2014, p. 53). With the support of technology, the projection of the future probability can be calculated and estimated by the combination of satellite data and is processed through a computer system then interprets into understandable graphics. In terms of national security, geological scientists raise their concern about the survivability of humans if this continuous reaction is unstoppable. Moreover, scientists understand it is difficult to make everybody aware of this dangerous situation, and some of them had no choice but to commit to supporting the factors catalyzing the melting of the Himalayas glaciers. As far as the research is concerned, all the impacts given have the potential in triggering another dangerous negative potential subsequently. Some of it is likely happening like a chain reaction and some of the others happening silently in weakening the national security of the countries involved without significant sign or notice. Therefore, the long and patient observation needs to continue in order to keep analyzing the expected behavior, or any other new reaction implicated in the negative impact of the global warming phenomenon. Again, the remainder and alert continue to be as a medium to educate people about the importance of stopping any action contributing to the global warming factor. Nations should have noticed the horrifying consequence and planned something significant, starting with the stern action against the individual or groups against the government motion to react in fighting global warming from continuing.

Conclusion

Based on the implications listed above and the analysis which were made by comparison from the impact given by categories, it is understandable that the negative influences are more detrimental to the acceptance by the Himalayas regional community and generally to the world. Undoubtedly, it is not a kind of favorable condition to be happening when the effect of doubling the melt of the Himalayas glaciers is taking place. Globally, living in the uneven distribution of prosperity, seeing some of the developing countries in the Himalayas region are still finding their way in achieving a stronghold in economics and still accepting any method towards it even though it is compromising the balance of the ecosystem available today.

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