

Desertification of the Gwarkhola River: A Study of Ecological Ethics

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Abstract

This research paper tries to explore ruthless human behaviour over nature such as over excavation of river based materials. Further it investigates our recklessness and indulgence in fulfilling present needs. It tends to remind our moral duty on ecology. Good utilization of the Gwarkhola River could be milestone for economic development and environmental health. Not only agriculture has been declined but also environment has been affected. It applies mixed method. Theory of sustainability and concept of Anthropocene are methodological framework to assess ecological ethics. Gwarkhola once used to provide sufficient water for irrigation. It was the source to cool riverbank. Nowadays, it has no water except during the rainy season. Almost no one bothers to think about its present condition. Overconsumption of natural resources create environmental problems. In the same way, Gwarkhola's desertification may cause climate change problem even though in a small scale. Political leaders and stakeholders are failing to preserve it. Some powerful people having political approach are making money by selling its sand, concrete and stone. They are exploiting it. This process directly affects local residents but no one has raised this issue strongly yet. Results of this paper are that selfish human activities show how much irresponsible and unethical towards nature we are. In the name of sudden economic prosperity, we are losing long term economic and ecological prosperity. The degradation of the Gwarkhola River is due to the ignorance, indifference and reluctance to preserve it. This justifies that we are morally debased. It is necessary to realize our duty and responsibility towards nature.

Key words: Capitalism, degradation, disaster, sustainability, agriculture

Introduction

Ecology refers to environment and its functioning. Its regulation is interrelated: relationship between living and non-living things. As far as ecosystem works, our existence is assured. We have to be responsible towards environment. It is for our own sake. In order to sustain our life on this planet, we must show our ethics towards nature. Natural resources are the sources to make this world livable. It is our responsibility to preserve nature for future generations' use. In the name of development, we are exploiting nature. Excessive consumption of natural resources have been resulted in disasters. On one hand, their quality has been harassed and on the other hand they are on the way to finish. Ethics is the term that suggests our moral duty. We are becoming so unethical that even we do not mind to endanger ourselves. One can be unethical to obtain selfish goal. However, we are either ignorant or irresponsible towards nature. Ecological ethics demands our duty and responsibility to sustain

nature. If we sustain nature it is sure that nature will sustain us. Despite the fact, we are just indulgent in fulfilling our individual interests. Consequently, nature is degrading day by day because of our unethical practices on nature.

Gwarkhola is the major river of Tulsipur Dang that is located about in three kilometers distance from Birendra Chowk (the roundabout at the heart of Tulsipur City). Its climate is moderate. As it is located nearby the major city Tulsipur, it is sure to be affected by the increasing population rate in the city. My subject of interest is in natural phenomena which highly strike my mind when they are in good condition but worry me while seeing them declining because of the ruthless human activities and extravagant consumerist practices. Not only does this paper examine the condition of Gwarkhola River, but also draws people's attention to it. However, now, it has no longer potentiality to embrace us. Who is responsible for it? What will happen to it in future? Such questions are right before us. We know that without nature we cannot survive. We are inseparable to nature. How much we are aware of it is a crucial question. Based on Gwarkhola River, many scholars, journalists and stakeholders have raised issue of smuggling of river based mining materials but they have left its interconnectivity to the human civilization. In spite of the degrading condition of Gwarkhola River, why the concerned authorities, stakeholders and even the directly affected locals are indifferent to it is a researchable issue.

Literature Review

Natural resources are our wealth. River is helpful to obtain agriculture based economy. it can promote tourism industry. From the hill side (Holeri) to Terai (up to Banke), there is possibility of water shipping. Gwarkhola River connects Terai region to hilly region. Rao G. K. and Piya B. (1996) also find it a prominent river. "Babai River is the major river in the valley which flows from east to west along its southern margin. Some prominent streams in the study area from east to west are the KatwaKhola, SewarKhola, HapurKhola and Gwarkhola" (p. 1). Chairperson of ward 16, Madhav Oli, says that "Gwar Civilization is very old civilization. Once there was a rhetoric about it that fields that are irrigated by Gwarkhola produce much crops. Our civilization started and advanced with this river." As water is the basic element for survival, it saved lives. People were dependent on it.

However, people started to be selfish. They ignored its contribution to the development of Gwar Civilization. They started to disturb its natural course to quench their immediate economic needs. FIAN (2014) finds that unmanaged excavation has directly affected it:

Haphazard excavation of stone and sand by a crusher company has affected the livelihood of communities in six VDCs. As a result of the haphazard excavation activities at the bank of Gwarkhola rivulet in Dang district the water level of the river has lowered, which has negatively affected 16 irrigation canals fed by the river. This has directly affected the livelihood of 19000 households from Halwarpur, Bijaure, Manpur, Duruwa, and Tarigaun VDCs who depend on the irrigation canals for agriculture. (p. 26)

This has affected water level in the river and farmers have suffered from irrigation problems. Irrigation canals are almost out of reach to the water level. As a result arable land is going to be barren for forever. Irresponsible human activities are the malice to natural resources.

Our activity on the riverbank is changing the natural flow of river. River bank is changing to a desert because of over excavation. Pramila Shrestha and Naresh Kazi Tamrakar confirm, "Rapid land

use change, vegetation clearance, lateral channel shifting, unconsolidated bank material, excavation of riverbed and riverbank sediment are major causes of bank erosion and sediment loss” (45). Khet Raj Dahal et al. find that people living near the river bank depend on the river. Similarly, rivers project their cultural heritage and economic prosperity and their respect for nature, environment, and the understanding they acknowledge the ecological processes. In the same way, rivers provide those materials and resources to sustain their life, however overconsumption of these resources to fulfill their needs is depleting the rivers’ condition (1). These commercial activities are responsible for the scarcity of water.

Similarly, people are eroding arable land and losing lifeline. People are crossing the boundary of humanity, love and affection to the nature. In “Songlines” Bruce Chatwin (1987) mentions decline of agricultural land in this way:

“Unscarred, you mean, by roads or mines or railways?” “To wound the earth” he answered earnestly, “is to wound yourself, and if others wound the earth, they are wounding you. The land should be left untouched: as it was in the Dreamtime when the Ancestors sang the world into existence.” (p. 11)

Arkady answers Bruce Chatwin’s question whether development has destroyed the original quality of Australia’s agricultural land. Exactly, Arkady mentions that if we destroy land we will destroy ourselves. These issues must be addressed ethically in time unless, there will be too late to address such challenges. In this way Gwarkhola River fails to keep its previous charm. My Republica news reported by Devendra Basnet says, “Flood in Gwarkhola had obstructed Ghorahi-Tulsipur road section throughout the day” (Basnet, 2016, pp.11). If we disturb nature, we are disturbed in return. Turmoil in nature causes turmoil in our life.

Nature provides peace and prosperity. Streams along with wild nature add beauty to the phenomena. As an analogy to this river, Dorothy Wordsworth defines arable land and its beauty in this way:

After ascending a little while we heard the murmur of a stream far below us, and saw it flowing downwards on our left, towards the Nith, and before us, between steep green hills, coming along a winding valley. The simplicity of the prospect impressed us very much. (Wordsworth, 11)

People left to nurture Gwarkhola and it may no more serve Gwarkhola residents in near future. Now, arable land has been changed into dense residential urban area. Hakahaki Online report says:

District Coordination Committee has given consensus to contractors to excavate twenty streams along with Gwarkhola River. Contractors are excavating offending parameter. This is extreme exploitation of natural resources. According to the criteria designed by law, there is a provision to do environmental impact assessment (EIA). It is not allowed to excavate more than one meter deep. Ignoring the rule contractors are excavating five meter deep. Contractors are excavating river-based materials not only by shovels but also by excavators. (My translation, Anonymous, 2018, p.1)

This brutal activity has thinned the layer of concrete in the river. Surface of the river has deepened. Concerned authority has failed to preserve it. It seems like Thames River as detailed in T.S. Eliot’s poem, “West Land”:

But at my back in a cold blast I hear 185

The rattle of the bones, and chuckle spread from ear to ear.

A rat crept softly through the vegetation
Dragging its slimy belly on the bank
While I was fishing in the dull canal
On a winter evening round behind the gashouse 190
Musing upon the king my brother's wreck
And on the king my father's death before him. (lines 182-192)

In these lines, Eliot shows the degrading filth bank side of the Thames River. Besides, he is mourning for the degradation of nature. Rivers are contaminated and it has affected aquaculture.

In the name of sudden economic growth, we are clearing natural resources. We have to see this river from alternative point of view. We make money by any means forgetting ethics. We are ethically dry. We have not utilized this river wisely. FIAN argues that random excavation at Gwarkhola River has affected irrigation system. Pramila Shrestha and Naresh Kazi Tamrakar discuss about riverbank erosion, Khet Raj Dahal et al. maintain that deposition rate of river based material is lower than extraction rate. Bruce Chatwin concerns about disturbance to the nature. Devendra Basnet's news report discusses about natural disasters like flood at Gwarkhola River. Hakkahaki Online says that contractors excavate in depth ignoring the code of conduct. Dorothy Wordsworth finds ecstasy in nature. T. S. Eliot's poem exposes how morally empty we are.

Research Gap

Scholars have raised the issue of degradation of natural resources and news reports and articles have epitomized its current condition so far. However, the issue of our own responsibility to preserve The Gwarkhola River is yet to be researched. How irresponsible behaviour towards nature can ruin nature is the researchable question.

Statement of the Problem

This paper probes the major cause of the Gwarkhola River's degradation, which is the irresponsible activities of local communities, stakeholders, governmental authorities - local and central, and river-based material trading companies engaged in excessive excavation for short-term income.

Research Tools

This paper applies interviews, research papers, news articles, statistic reports from the Government of Nepal, and field visit as the tools to review existing problems happened to the Gwarkhola River.

Research Question

This paper finds these questions as the research questions: What has made us overuse the river based materials of the Gwarkhola River? How this problem can be solved by introducing ecological ethics?

Research Objectives

The objectives of the study are to find out the main causes of the degradation of the Gwarkhola

River and provide solution to sustain it.

Methodology

This paper applies mixed method; both qualitative and quantitative. I have applied research methods like field visit, interviews, news articles analysis, and statistic reports provided by concerned authorities. Furthermore, the concept of Anthropocene and theory of sustainability are suitable here to discuss the relationship between nature and creature. Anthropocene term was first documented by Paul Crutzen and Eugene Stoermer and that claimed the central role of human to affect the ecological system. Human beings are altering the fundamental function of the whole planet and local. Major planetary systems are affected by human activity. Ecological system is in vulnerable condition. We must know its importance for the life in the planet. Its origin can be from the wake of agriculture in the world.

It is relevant to discuss about the theory of Ecocriticism in correlation with Anthropocene and theory of Sustainability. Anthropocene theory focuses on the dominant role of human desire over ecology that undermines concern about environment. Ecocriticism establishes relationship between human culture and natural resources that prioritizes the conservation of the nature for long-term use. Both these theories criticize the socio-cultural aspect that is responsible for the condition of natural resources. Ecocriticism describes not only functions and policies but also the narratives of development, ignorance and exploitation of the nature. Analyzing the Gwarkhola River's present condition from the perspective of Ecocriticism, it provides framework to explore unethical practices, policy and culture. This paper integrates ecological thoughts and suggests need to reshape narratives of development and economic prosperity. In the name of financial growth people have become selfish towards nature. Ecocriticism suggests that we have to be responsible towards the Gwarkhola River for ecological justice while fulfilling our needs.

Immediate Benefit Influencing Authority

Consumerist society based on capitalism gives value to money as a major tool to inherit materials what ignores value of nature. For the sake of money people sell whatever they can. There are four crosser factories to refine sand, concrete and stone. Excavation work has destroyed its course. Currently flowing river has been changed into many loaches. It has become damp and slum. Gravel smugglers excavate and dig it as deep as they can get concrete. Though there is a provision to restrict crosser factories around five hundred meters, power holders offend this. Even one of the crosser factories has been installed against pillar of Gwarkhola Bridge. Chief District Officer (CDO), police and mayor of the local level government do not inhibit them.

Though there is legal code, power holders are recognizing their own motto to promote their business based on river and river based resources ignoring the directory. Monitoring body is under the pressure of these contractors. On one way or other Nepal's politics has been affected by such contractors and businessmen what affects natural resource of Nepal. This is why District Coordination Committee has failed to monitor such illegal excavation and take crucial actions against them. Only in rainy season there is high flow of water. In summer season it is so difficult to distinguish as a river because it looks like a field. Naya Yougboadh reporter Gokarna Paudel (2021) reports:

According to Ghanshyam Dangi, spokesperson of Tulsipur Sub-Metropolitan City, excavation has been done more than one meter as reported by local peasants. Chief District Office, Dirgh Narayan

Paudel satires, “It is excavated three times of one meter.” There is a provision that says it is prohibited to excavate around five hundred meters from bridge. However, excavators are there too near to Gwarkhola Bridge. (Paudel, pp.2)

On one hand there is a regulating system but on other hand this system doesn't work. Still excavation work is ongoing there. Ridges are being made in the river. Certainly, river is losing its harmony of sand and stone. Excavation is profiting those handful illegal contractors but most of the people are facing irrigation problem. There are farmers but can't raise their voice against this because they fear of hooligans. Scoundrels threat them and they just look it quietly. They are majority in numbers than those villains but lack unity as they have. They are impatient but silent. Why the problem is prevalent.

It is very difficult to preserve river in Nepal because of the lack of rule by law. We can borrow some references from Aakash Jha. She mentions in her news story, “The crosser which is responsible for the murder of Dilip Mahato is still open. It seems power and entity is killing Dilips daily. Dilips will be killed simultaneously because of the state's coalition with smugglers” (Jha, 2021, p.2). This is also applicable to this Gwarkhola River. One day we will face same problem. Likewise Rajmarg Online report says, “Near Tulsipur -16, Jagatgaun, north and south sides' land has been encroached. Cottages have been installed in this vacant public land. About two hundred Bighas of proclaimed industrial area has been encroached” (Anonymous, 2021, p.1). It is very difficult to enforce provisions and laws due to power politics mechanism.

Inviting Potential Disasters

Likewise, nature is prepared for vengeance. When human effort doesn't work for its preservation, reviving becomes responsibility of nature per se. Its original course and shape has been changed owing to over population. According to Nepal Central Bureau of Statistics in 2001 population of Tulsipur Dang was 115759, adding 27110 numbers on it; in 2011 it reached up to 142869 whereas in 2021 its population reached 180734 adding 37865 numbers in it. Now, its annual population growth rate is 2.3%. Its population density is 469.9 persons per square kilometer. Within twenty years span 64975 numbers of people added to its prior population. Certainly change in population affects the use of natural resources. Encroachers added more land under their possession through encroachment. This is how people started to reside on the bank of the Patukhola and Gwarkhola River. The Kathmandu Post reporter Chandra Kumar Mandal (2021) discusses disaster:

Floodwaters from the Melamchi River have gushed into the settlements and main market, displacing over 100 families and leaving behind destruction that could run into millions of rupees. Videos and photos posted on social media show muddy water reaching as high as the first floor of houses in the area. People were left stranded on roofs of buildings. (Mandal, pp.2)

This devastation will be applied for Gwarkhola as well. Rashtriya Samachara Samiti (2021) reports, “A woman and her son died after they were swept away by Gwar Khola, a rivulet in Dang district, on Monday”. Similarly, Durgalal KC (2016) reports, “Three people have died in floods that occurred in Gwarkhola River at Ghorahi-Tulsipur road section.” Great loss will occurred. As a result, we will be there to face the same problem.

Human activities on the nature are hostile to its natural condition. These activities are resulting in various contrary situation over nature. Paul J. Crutzen, Eugene F. Stoemer and Will Steffen consider

that these activities are impacting on nature bringing drastic changes which are problematic for future generations. These changes cause geological and ecological problems (484). Human role became the “powerful concept for framing the ultimate significance of global change” (487-488). Human activities are responsible for bringing adverse situations in the world. Tracey Skillington maintains, “Because of human’s reluctance to the preservation of the world there may happen “severe drought, water deficiency and poor crop yields” (233). Human beings play vital role to either preserve or destroy the nature.

Indifference towards Its Preservation: Lacking Responsibility

For the sake of nature local people must take charge of it. They know the true value of this river. Their childhood love is connected to this river. They have connection of ages. Similarly, this river is connected to their livelihood. Now fishermen are displaced. Peasants are displaced. It associates with their culture those play along with this river. River has become a type of commodity for those who only concern river as income resource only. Now, local government has authority for conservation and commodification. However, it has failed to preserve Gwarkhola River. This issue has not been taken seriously even by directly affected local residents. Who will preserve this river? Human beings are responsible to preserve it. Tracey Skillington accepts that humankind is the key source of changing atmosphere and future of this planet (229). Human activities on the earth are proving to deplete nature day by day. Unethical use of nature for selfish motifs is the reason for the destruction of nature.

“Gwar Civilization” in Danger

Most of the human civilizations are based on river. Similarly, Gwarkhola River has its own human civilization. It provided irrigation for agriculture and its bank was the source for animal husbandry. There were lake-like large ponds. One of the villagers, Kaluram Badi says, “I used to fetch economical needs by selling fish but now I left this job because there is no fish. I work as a rickshaw rider” (Badi, personal communication, August 25, 2021). There were terrains of large agricultural fields. Local residents’ annual income was based on paddy, wheat and lentil. It provided grass and straw to feed cattle. One of the peasant, Om Prakash Pokhrel says, “I used to grow crops and I afford my three children good education by this piece of land” (Pokhrel, personal communication, August 22, 2021). It was means of life.

Though Gwarkhola has been degraded, the issue has not been taken seriously. Once, solitude river bank has become a dense residency area. Local people protested against the crosser installed against Gwarkhola Bridge pillar because its noise and dust is hazardous to their health and this crosser also endangers this bridge. Keshav Bhandari, one of the protestors says, “A gang leader came and threatened us stabbing to death” (Bhandari, personal communication, August 23, 2021). This shows that people who care for the beauty of Gwarkhola River are helpless. Only a few journalists raise this issue. Such threatening issues are so dangerous for journalists because they are not free from the threats of such villains.

Necessity of Sustainability

Sustainability tries to maintain the environmental condition improving its resource capacity. Lisa M. Butler Harrington maintains, “It is clear that sustainability emphasizes maintaining the desirable aspects of natural or social conditions and, when possible, improving such conditions, including the status of natural resources” (366). Similarly, sustainability promotes food supply

accelerating its productivity. An ethical utilization of Gwarkhola River is necessary. It should be preserved for future generations. Local inhabitants nearby Gwarkhola River are responsible for the maintenance of the ecosystem. "Rural residents generally live and very often work in close connection with the ecosystem processes that support global, regional, and local populations" (369). Consumers of this river, residents and local level government should have long term policy to sustain it. This resource should be utilized in a limited way.

Sustainability prefers durability of the natural resources for the long term use. For N. Pollesch and V.H. Dale, "Sustainability is a combination of several aspects of the physical and biotic environment, social welfare, and economic wellbeing" (117). It comprises social and economic life under the good condition of the nature. In order to save Gwar Civilization, we must focus on its preservation. Kevin Gibson clarifies that sustainability is the embedded part of stakeholder theory that is environment itself rather than a marginal issue (15). Stakeholders should show their responsibility and monitoring body must enhance Gwar Civilization. Lisa M. Butler Harrington considers, "Sustainability can be defined as the capacity to maintain or improve the state and availability of desirable materials or conditions over the long term" (365).

However, we are not focusing on sustainability rather focusing on immediate profit. For its long term availability and for our economic growth we must be ethical towards ecology for sustainability.

Findings

Findings of this paper are: regarding nature, people have been highly selfish and foolish to such an extent that they are ruining their own life. Because of this, natural resources have been voided and there is serious threatening from the side of nature. One day people will get nothing from nature and they may be rich by money but poor by nature. Increment in population demanded more houses and open space. In search of such places people started housing on the Basin of Gwarkhola River. One of the groups is there to make money by selling its layers: sand, stones and concrete. Concerned authority is failing to preserve it: either they lack strong policy or they have no will power. If this process is not stopped their will be no water. This will bring water short comings. Both agricultural land and irrigation system are under crisis.

Conclusion

In conclusion, there are many evidences which justify inhuman activities like excessive excavation and encroachment over Gwarkhola River due to over population. This growing population status shows that people are indifference to conserve it. The native Kumal people have lost their ownership and immigrants are reluctant to regard it as their precious natural heritage. We must know the interrelationship and interdependency between nature and human. Gwarkhola River is part of our life. It irrigates agricultural land in its basin. Due to lack of its preservation, nowadays we are facing scarcity of grains. When nature is exhausted, we are also challenged. This is how we face flood and inundation during rainy season. When nature loses its existence our existence will collapse as well. Green forests cannot be restored in its absence. We are satisfied with underground water but do not care for surface water. As it is the major source of water, after few years we will face underground water crisis. As a result, there will be no water in our wells. For the quick income, people are reluctant to preserve the sustainable income source. We must think about benefit for all more than benefit for self only. Local level government is also responsible for its conservation but has failed to preservation invaluable Gwarkhola River due to the lack of strong policy. Public effort

is needed to bring everything on track. This is why we, the common people, cannot escape from our own responsibility to preserve Gwarkhola River for our livelihood. Political parties should pay their attention if only they work for public welfare. Our behaviour should be appropriated according to the sustainable management of the planet to optimize the environmental function.

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References

- Aakansha, Jha. (July 1, 2021). "Dilips are Killed Daily", Jhan Naya, https://jhannaya.nayapatrikadaily.com/news-details/1411/2021-06-26?fbclid=IwAR1_LdMiGhuK1UV6UZ1imt9Ohk9iLDZhLM6Letnm-s7BVmYG8qKatzU-Ifc.
- Bruce, Chatwin. (1987). *The Songlines*, Franklin Press, Penguin Books, ISBN: 9780099769910.
- Chandra Kumar, Mandal. (June 17, 2021). "Flood devastation in Melamchi not only because of rains", <https://kathmandupost.com/climate-environment/2021/06/17/flood-devastation-in-melamchi-not-only-because-of-rains>.
- Crutzen, Paul J, and Eugene F Stoermer (May 2000). *The Anthropocene. Global Change*
- Devendra, Basnet. (July 26, 2016). Over hundred houses inundated in Deukhuri, My Republica, <https://myrepublica.nagariknetwork.com/news/over-100-houses-inundated-in-deukhuri/>.
- Dorothy, Wordsworth. (May 19, 2009). *Recollections of a tour made in Scotland A.D. 1803*, edited by J.C. Shairp, The Project Gutenberg eBook, www.gutenberg.org.
- Eliot, T. S. (2005). *The Waste Land: The Fire Sermon*. In M. Ferguson et al. (Eds.), *The Norton Anthology of Poetry* (5th ed.). W. W. Norton & Company.
- FIAN Nepal (August 2014). *Parallel information: The right to adequate food in Nepal*, (Article 11, ICESCR).
- Gibson, K. (2012). *Stakeholders and Sustainability: An Evolving Theory*. *Journal of Business Ethics*,

109 (1), 15–25. DOI: 10.1007/s10551-012-1376-5

- Gokarna, Paudel. (June 7, 2021).. “Illegal excavation at Gwarkhola”, Naya Yougboadh, <https://nayayougboadh.com/news/2021/06/08/234602?fbclid=IwAR2uo0BMbjubGXEsByeHBaptYsXulszdmrrJTIWWAmVNBe-C9LsQebUBKGU>.
- Hakahaki Reporter. (14 May 2018). “Illegal excavation on every rivers in Dang”, Hakahaki Online, <https://www.hakahakionline.com/np/2018/05/14/3527/>.
- Khet Raj Dahal et al. (2015). Economic Activities Associated with Extraction of Riverbed Materials in the Tinau River, Nepal. *International Journal of Economics and Management Sciences*, 4:6. <http://dx.doi.org/10.4172/2162-6359.1000263>.
- Lisa M. Butler Harrington (2016). Sustainability Theory and Conceptual Considerations: A Review of Key Ideas for Sustainability, and the Rural Context. *Papers in Applied Geography*, 2:4, 365-382. DOI: 10.1080/23754931.2016.1239222.
- N. Pollesch and V.H. Dale ((2015). “Applications of Aggregation Theory to Sustainability Assessment” *Ecological Economics* Vol. 114, 117–127.
- Newsletter, No. 41, pp. 17–18.
- Paul J. Crutzen, Eugene F. Stoemer and Will Steffen. *The Anthropocene. The Future of Nature: Documents of Global Change* edited by Libby Robin, Sverker Sörlin and Paul Warde, Yale UP, 2000. JSTOR, 2021. <http://www.jstor.com/stable/j.ctt5vm5bn.52>.
- Pramila Shrestha and Naresh Kazi Tamrakar. "Bank Erosion Process and Bank Material Loss Potential in Manahara River, Kathmandu, Nepal." *Bulletin of the Department of Geology, Tribhuvan University, Kathmandu, Nepal*, Vol. 10, 2007, pp. 33–44.
- Rajmarg, Online Reporter. (December 21, 2021). “Industrial village encroached; representatives are silent”, Rajmarg Online, http://rajmargonline.com/archives/24802?fbclid=IwAR16UHJNpwBFj14HNZTi6jUxxs7xTZuBHh3oeXzyfTPVPlrP2bzZ_ao6W2I.
- Rao G. K. and Piya B. (1996). Hydrological conditions in Dun valley of Dang, western Nepal: a case study, *Journal of Nepal Geological Society*, <https://www.nepjol.info/index.php/JNGS/article/view/32397>, Vol.14.pp93-98.
- Skillington, Tracey. (2015). Theorizing the Anthropocene. *European Journal of Social Theory*, 18 (3), 229–235. <https://doi.org/10.1177/1368431014568893>.
- Statistics Nepal. (2001, 2011,2021). Tulsipur Sub Metropolis in Nepal. Nepal Central Bureau of Statistics, City population, <https://www.citypopulation.de/php/nepal-mun-admin.php?adm2id=5610>.
- Rashtriya Samachar Samiti. (9 August 2021). “Mother, son swept away by river in Dang, die”, Nepal News, <https://nepalnews.com/s/nation/mother-son-swept-away-by-river-in-dang-die>.
- KC, Durgalal (12 August, 2016). Three Killed in Dang Flood. *The Kathmandu Post*, <https://kathmandupost.com/national/2016/08/12/three-killed-in-dang-flood>