

Chapter II

Traditions and Cultures of Water Conservation in the Himalayas

Dr Govind Singh

Associate Professor of Environmental Studies and Assistant Dean, Academic Affairs,

Jindal School of Environment and Sustainability, O P Jindal Global University

Abstract: This chapter delves into the traditional and cultural practices of water conservation in the Himalayan region, emphasizing the critical role the Himalayas play in supplying water to millions across South Asia. The chapter explores ancient water conservation systems such as Naulas and Baolis, which have been vital for sustaining local populations for centuries. It also highlights the cultural reverence for water, with practices rooted in spirituality and community. However, the modern challenges of climate change, over-tourism, and unsustainable development are threatening these traditional systems. The chapter advocates for the integration of traditional knowledge with contemporary sustainable practices, especially through eco-tourism and community-based water conservation efforts, to preserve both the environment and the cultural heritage of the Himalayas.

Keywords: Water Conservation, Himalayas, Naulas, Traditional Knowledge, Eco-tourism



Chapter II

Traditions and Cultures of Water Conservation in the Himalayas

Dr Govind Singh

Associate Professor of Environmental Studies and Assistant Dean, Academic Affairs,
Jindal School of Environment and Sustainability, *O P Jindal Global University*

I know that Delhi and other cities, at least in north India, receive their water from the Himalayas. Therefore, one cannot work on urban water management by ignoring the Himalayas. That's where you should begin and that's why each time every few months and you will find me going to the Himalayas to learn about what is happening there and what kind of changes are taking place there and what kind of research initiatives can be taken to ensure that we conserve whatever resources are remaining, are left and ensure that the Himalayas do not run into trouble at least in terms of water resources. So that's something that motivates me to keep going to the Himalayas researching learning from the mighty mountains and sharing the knowledge with everybody interested to learn about it.

To begin with, I would like to share the motivation which I've already clarified as the fact that the Himalayas are the source of drinking water and all sorts of water for the people who live downstream, for all of us. That's something that keeps me motivated to kind of keep visiting the Himalayas and learning about what's happening there. There's something else that also connects me and many of us to the great Himalayan systems. India is named after the Indus River system, which originates in the Himalayas, so we have therefore a very organic, very robust connection with the Himalayas.

We can argue that this river now is not mainly flowing through into the country of India, but it's very much still a part of the Indian subcontinent. And that is what is a very interesting kind of connection that we must all remember that the very source of origin is a river system originating in the Himalayas. That's something that kind of needs to be in the background of all that we do in terms of managing the Himalayan ecosystem and the nation as such. The second point of motivation that kind of keeps me very excited in terms of the Himalayas and what's happening there is concerning the fact that India happens to be the only country, and a few may be in the Indian subcontinent. So, I can say the Indian subcontinent is the only region in the entire world where rivers which carry water are prayed for, are considered holy, are considered sacred and are given that kind of respect. And interestingly, in the north, we know

that a lot of these rivers originate in the Himalayas itself. So that is something that needs to be said more often to ensure that we remain associated, remain connected both in terms of the physical benefits we get from the rivers, but also in this the spiritual connection that we have with the rivers, should not be lost. Because you have already seen that we have lost that connection in the cities of the country and we have done that when that connection has been lost those rivers have turned into drains.

Let's not go very far away if we just talk about Delhi, we know that the Yamuna River that flows, which originates in the Himalayas flows through the city of Delhi when it leaves Delhi. It's nothing less than a drain. That's what we've done to it. So clearly, the spiritual connection with the river has been lost, which needs to be revived as a first step to ensure that we can do something about the river Yamuna. So, two points, that's something that I thought I'll put out there is a paper that I put together for a UNESCO journal which says 'Traditional water systems and cultural practices in India' where I begin with this very point that India happens to be one of the very few countries in the world which are named after a river system. I think that's how organic our connection is with water and with rivers.

The Himalayas beneath the world's roof, which I would say would be Tibet, are a source of water and livelihood for millions of people in South Asia. Some estimates suggest that 1.3 billion people in the entire world depend on their water demand to meet their water demand directly or indirectly in the Himalayas. That's a big number to think, about all the people of South Asia. That's the importance of the Himalayas in the world. That's the number of people that depend on the Himalayas because they could just meet their water demands. We also know that water has always been part and parcel of traditional and cultural life in the Himalayas. Its importance has always been known to the people who live in the Himalayas. And this fact is proven. I'm sure something has already been spoken about on this. This fact can be shown or established folklore, a large number of traditional songs that exist in the Himalayas keep on focusing on the topic of water. They do not forget water because they know it's an integral part.

Something very important and interesting here is the fact that recently, however, there has been a change and the change is that the source of water for almost 1.3 billion people is now suffering from a water crisis itself. I shared just one image to get across this point, which is an Instagram screenshot from a user from about two or three years back where she's making a plea to the tourist who throngs the city of Shimla that they should stop coming to Shimla, which is like the queen of hill stations, it has been established as that. But she's saying that people must stop

coming to Shimla. And then she clarifies that the city is facing an acute water shortage. The people are not getting enough water to drink, sometimes even sewerage water is just sent to the house for drinking instead of water for use and that she says is the state and status of water sources in the Himalayan city. That's what happened then and therefore she concludes by saying that until it rains and snows in an adequate amount the only way out is not to put added pressure on Shimla. That's what's happened to one major city, the Queen of hills, that exist there that water has become a limiting resource.

This is very upsetting because, on the one side, we are saying that 1.3 billion people depend on water that comes from the Himalayas and on the other side, we are saying that the Himalayas are now facing an acute water crisis so much so that people are saying please stop coming, telling other people, their countrymen and women and please stop coming to the Himalayas. That's a disturbing trend. That's something that needs to be explored and that's where I began my research, which feeds into this particular presentation focusing on developing ecotourism in the Himalayas. How can we look at tourism? Transform it by involving sustainable means in ecotourism, and responsible tourism. So that's what we're trying to do. I began this research at the beginning of last year and then the pandemic struck so I cannot do much, especially for field work. So whatever little knowledge I gathered so far, I thought I will share it with all of you through this presentation and kind of take your feedback as well. It's both giving and learning from all of you as well.

Moving from Shimla in Himachal Pradesh to Uttarakhand, the neighbouring state where again water is considered to be very sacred. We know that there are problems. I have pulled out three headlines from newspapers, from two different newspapers. The first one talks about Dehradun which is again a capital city where it says 391 areas of the Dehradun district are prone to water scarcity. And then a year later, we know that the entire state of Uttarakhand is facing an acute water crisis. It's not just in Himachal, it's also happening in Uttarakhand. And finally, water shortage worsens as tourists influx peaks in Uttarakhand. This also has some direct or indirect connection to tourism. And so does a motivation to make sure that we understand what kind of impacts tourism has on the Himalayas and how can we convert tourism into ecotourism. That's where we began our research. That's where some aspects of traditional knowledge, learning from the people became helpful and something we are trying to do to ensure that the knowledge that the people have can be used in this ecotourism development.

My focus is the Himalayas. As already mentioned, the Himalayas play a large role in the lives of people who live beneath them. Also, people of the plains get their main source of drinking water and all other sources of water from the Himalayas. But I'll take you even further down south away from the Himalayas if you may, to a place in Maharashtra called Uttareshwara temple. I can put one quick image that I've captured from the Internet. I was keen to find out the oldest surviving temples in India. I'm not sure how academically accurate it is, but it had interesting images from across the country which talked about the oldest temples that are still standing in the country. I found this to be very interesting and exciting because this is what most temples in our country look like. If you observe, you find a small entrance, which is how we find most temples in the country, we have, this is for the big structure and behind the small entrance we have this large dome-like structure. In front of this dome-like structure, we have some plain areas. If I break it down into terms to understand what they are called. The small entrance we see is a very common sight and I hope all of you can relate to it. Anybody who has seen a temple or has gone to a temple would know that the small entrance is usually known as a *Garbha Griha*. That's like a small place and inside that, if you enter you will find an idol placed and kind of some mini structures made in the wall and they'll probably be a Panditji who will do some pooja and he also probably use some *prasad* in the end.

I love going to temples. I very often go. I'm six feet tall and each time I'm trying to enter the small entrance, I often bang my head. But I believe that I've been blessed. I have received a lot of blessings from God, so it doesn't hurt. I still keep going back to temples and all religious institutions to pay my respect to God. So that's one small part of the temple which is called the *Garbha Griha* and then towards the back, you find a big structure which is often referred to as the *Shikhara*. It's like a large dome-shaped structure. I'm sure all of you can relate to it if you've been living in the country and have been going and travelling in the country. The plain area in front of this *Garbha Griha* is often referred to as the *Mandapa*. It's also called a *Mandab*. I think in south India, but otherwise, generally, it's referred to as the *Mandapa*. So, I hope all of you can relate to this. This is nothing new. This is something you already know, but I'm just trying to put terms to structures that we very often see in the country in the form of temples. So that's what we kind of look at or know temples as. I've always been very fascinated to understand and find out why we design temples in this way. Is there something that we are missing? Is that something that needs to be spoken about in terms of the architecture, in terms of the planning of how the temples are designed?

I completed my Masters in 2007 and my dissertation work that you are supposed to do because I was a student at the University of Delhi is focused on the environmental impact assessment of big dams in Uttarakhand. So I spent almost six months in Uttarakhand and then after that, I kept going back to the Himalayas and looking at different things – architecture, structures, practices etc. that existed. One fascinating structure one came across was some sort of a water reservoir commonly known as *Naula*. This particular structure is known as *Ek Hathia Naula* and is located in the district of Champawat, Uttarakhand. It's believed to have been constructed in the sixth century A.D. If you speak to locals, that's the date that they like to put on it and this particular structure is known as an example of a traditional and cultural method of water conservation of water, of accessing and harnessing water and is known as a Naula. Many of you I'm sure would probably know it as a Bowdie. This is an example of a Bowdie in the Kumaon part of Uttarakhand.

Uttarakhand is usually divided into two parts: Garhwal and Kumaon. This type of Bowdie is popularly found in the Kumaon part of Uttarakhand. This is a structure very interesting and the reason why I put it out here right in the next slide after the slide of the temple is that if you observe, it will remind you it will directly give you an insight into what a temple architecture looks like. So, if you look at the structure from the outside, you will find a door that is always small. A *Naula* or a *Bowdie*, rarely has a big door. There are many reasons for it. One is that there is a stream inside or an underground water source coming on the inside and that underground water source has to be protected. So human beings should be able to somehow manage to squeeze in and enter but animals, especially other big animals should not be able to enter it, otherwise, it will become impure and you will not be able to kind of drink that water. It's a source of drinking water. Therefore, that's why and for other reasons as well because it's considered that the right kind of amount of heat will be maintained if the door is not too big. So that's why it's also made that the door is always small. I've been looking at these structures for almost fifteen years now and when I come to the plains and I look at these temples, I find a stark similarity.

As I said, I was fascinated to understand how temples get architecture. And then when you come to the Himalayas, you look at these structures. This is found everywhere. I'm just giving one example where I've done some work, but it's also found in the neighbouring states of Himachal. Even if you go to other states and anywhere in the Himalayas, you'll find some sort of a temple-like structure built, sometimes it has this water kind of harnessing potential, but sometimes it's just made on the road-like temple which also perhaps comes from this particular

architecture. And it is very ancient and if you observe on the bottom right screen, you'll find that you also have idols inside. The reason for doing that is to ensure that people consider it to be sacred. It's a source of drinking water and you can't have people fooling around there. You can't have people polluting or throwing stuff there. So it has to be considered to be sacred. In my opinion and that's what I want to show you in this presentation to connect you to this understanding that if you look at this Naula this is nothing but the source, the inspiration of the designs that we have of temples across the country. I have shown you the small entrance, the Garbha Griha. I have shown the inside of a temple with idols. But the question that you need to ask is where is the Shikara, where is the big giant thing on the top, so if you stand in front of this top left image and take two steps backwards and look upwards you will find the Shikara. What you'll find is the peak of a Himalaya, of a mountain peak. So that in my mind is like an absolute or a clear understanding of what or how we get the architectural design of a temple, of all temples. That's what they're designed in the way they're designed. This is not all. I would like to share a few more insights that are gathered from people and locals there which further has made me believe that this is the way how we have learned how to make temples.

I can show you a few more images. Some of these *Naulas* that you can see are from the Kumaon region. We can see it on the top left. It's a very interesting architectural structure made again and has a big giant Himalaya or a hilltop behind it. There's one more on the right, which doesn't have that hilltop but it's like an interesting structure made again, source water. Another *Naula* is on the bottom left, I have put a screenshot from a youtube video. The link is mentioned there. The reason why I have highlighted this image is to show and I'm not claiming that I'm the first person who is saying that *Naulas* are nothing but temples because this video already says that *Naula* is '*Himalaya ke jal mandir*', the water temple of the Himalayas. What I am saying that I have not found anybody says this before is the fact that whenever you see a temple in any part of the country which has the same structure that I just mentioned, we should immediately get reminded of the Himalayas because that is exactly what it is depicting and that is how deep a connection we have, India has with the Himalayas, each temple is like a Himalaya because it's built on the model of the Himalaya. To add here, I would say that all of us call Uttarakhand as '*Devbhoomi*' and sometimes even Himachal is also referred to as *Devbhoomi*, and none probably question why do we call it *Devbhoomi*. What's the reason? Here is one more illustration. We call it *Devbhoomi* because the very structure of a temple, the very idea of making a temple and how the idol is to be placed, what does it look like, comes from

Uttarakhand comes from the Himalayas. That's what also make them as Devbhoomi or religious places because we've learned all of our religion from there.

A few images that I thought I'll put out there to again make that connection. This happens to be one of the oldest known Naula that exist in Uttarakhand is what people will tell you. It was constructed, they say, in the thirteenth century. Like I said, there is no academic reference that we have for this, so we do have to believe and rely on local knowledge. There is Badrinathji ka Naula as well, which perhaps we learn from people and from the local sources there, dates back to the 7 CE right. The idea here is that these structures predate our temples predate a lot of things that we know and do. Therefore, they could very well be the source of the design inspiration for the temples that we've made across the country and in the Uttarakhand itself which is a very important thing because if you understand what I'm trying to say. What I'm trying to say is that our original gods were actually water and that's very true. They come from water and that's very true because what does a human being need to survive? You may need food, you can live without food for seven days or ten days, but the two basic things that you need are air and water. If you don't get air in whatever two or three days you will not survive. Seventy percent of the human body is water. I would like to tell you that air is still out there and we cannot pollute it, but unfortunately that's not true anymore. We can pollute the air. The air in Delhi is an example. But water is something that really needs to be protected because it's not as readily available as air and life depends on it. It gives you life, and what gives you life has to be something which is godly.

So that's the kind of respect we've given to the water resources in terms of cultural and traditional knowledge in the Himalayas. A few points here to get across this point. Why am I claiming that Naulas or are temple progenitors? Our ideas and designs have come for temples have come from these Naulas and Bowdies, which is something that needs to be understood, especially today when we are facing a huge water crisis. We need to realize that this is how important these structures are, which are being ignored. First, a few points that I have gathered from the literature. I have already mentioned, similar structure/ blueprint (Himalayas as the Shikhar). It's an essential part of every village or a group of villages and it's often decorated with carvings of gods which are usually Vishnu and goddesses. It's almost never Shiva. So I asked why this kind of discrimination, why not Shiva? Because Shiva is a god which is very powerful and although Mahadev is very popular in Uttarakhand, but Mahadev is also associated with snakes and that's not something that is desirable around a Naula, a place where people will go to get water. So you will almost always find a carving of a Vishnu there.

Again, knowledge gathered from the local people, in Kumaon, we know that a newlywed bride is required to first visit and offer prayers at the local Naula in every village before entering the house, a direct connection to what a temple is because this is also when we have a new person entering the family, when you buy a new car, we usually have a tendency or a habit to go to the temple. Like get it a Tilak or blessings and then come to the house. This is something that already happens there and has been happening for a very long time. This is traditional there. This is not something new. This has been happening for thousands of years. We also know that the steps that are inside this Naula, these structure usually are not random, but they have some design, some order is there. For example, they usually are three, five or seven and they go in that order, then never are two or four. Therefore, there is some system in place. They are that we probably today aren't aware of because we probably lost that knowledge, but there was some way to ensure that all these Naulas, all these structures had some similarity and had some structure, some order.

According to two locals who after great struggle, they would speak about this or kind of remind themselves of this because a great ancestor would have to told them things that's what they claim. They said, those steps inside the Naula where the water kind of naturally appears are cleaned with a special oil which sometimes catches fire and is done on special occasions. That structure in the middle of the Garbha Griha, actually resembles a Mandapa, which resembles a Mandapa kind of a structure. They say that there is a ritual, there is a certain crop or a certain plant that they grow in the field that is collected and usually burned there to clean it and then when the water kind of appears, it's cleaner. These kinds of references, these kinds of implications are very stark that again reminds us of the fact that this is exactly what we do in temples. This is how temples kind of have been culturally thought about.

A few more quick points and then I'll letting you move to the key part and in the conclusion. I won't take much time though. What we also know is that special prayer gatherings takes place around the Naula in all of Kumaon which takes place either at the village level or at the family level. For example, if a child is born in a family and the Namkaran has to be done, the child has to be given a name like this usually happens near a Naula, which is a water harvesting structure that looks like a temple. In all gatherings in the village, all important gatherings, discussions often take place around this Naula. It gets more interesting. We found that there are specific tree species which are to be grown around in the catchment of these Naulas. What

is the essentially, now we know it's basically groundwater which has come on the surface and suddenly because it is accessible for drinking, so people have covered it with a traditional structure. There are no new knowledge, all these not all are constructed hundred years ago. People in fact, are losing the technology and the knowledge of how these are constructed as well and the India Water Portal recently made a video of the last person who knows how to make a Naula. That exists now that's how kind of alarming the technology, the rate at which we are actually losing this traditional knowledge technology is actually happening.

But one more key point here, there are specific tree species that are being grown in the catchment of these Naulas from where water source is coming. That's known, in fact people do that. They kind of work on that. When I first heard of this, the first thought that came to my mind was that these have to be sacred trees. Another thought has always gone in my mind is why do people consider some trees more sacred than other trees. The immediate name that comes to mind is that of the peepal tree. In fact, I have had people who told me that peepal tree is very sacred because it gives oxygen both during the morning and during the night. Right now, as an ecologist, I must go and stop them because that's nonsense that doesn't make any sense. But as an environmentalist, I find that these people are very often saying this to defend the tree from being felled. There are some people who fell peepal tree and they say, look, it's a very important tree it gives oxygen even at night, so don't cut the tree. So, as an environmentalist, it's not right for me to at least go and check that person because even though scientifically he is incorrect, but at least he is speaking it for some purpose. I kind of taking these people on side and then explain them that look what you said was wrong, although I understand the sentiments but peepal does not give oxygen, no tree can do that at night. That is not how it works. So it may be giving much more oxygen and other trees that could probably be scientifically proven, but the fact that it gives oxygen is not true. But this question still has always remained in my mind that why do some tree species are more important, more holy than other tree species.

Here again, we find an answer for that because there is a reference which tells us that peepal tree and some sort of worship stones are often observed to be associated with Bowdies. These are the trees that are actually grown near in the catchment of the Bowdies. If you've done any kind of water harvesting study, you know that in the catchment, you want to only grow those trees that have elaborate root systems which can trap the water and store it, slow it down and keep it there. So, the Bowdie can be naturally recharged. Here is one example that we have of why the peepal trees could be and other trees also Banyan tree as well could be considered

sacred because they were always grown in the catchment of this particular structure called the Naula. Therefore in temples around the country we find that you often find a people tree growing near a temple. Perhaps the same correlation, the same connection.

One more reference I found from the People Science Institute, which says that Peepal and Banyan were planted near a Naula to signify its sanctity and to protect and shade it. The same logic, but here this particular study says that because peepal is sacred, so it is now being planted along Naula, so peepal don't desecrate it. But I can in the first reference change this to the other side as well that perhaps peepal and banyan became sacred because they have grown close to Naula, which is something that we now know resembles that of a temple. So we not only took the temple architecture from Naula, we also took the plants that are growing around it have a considered sacred to the rest of the country. And this reference also says that water sometimes was treated with medicinal plants, including tulsi, we find more connection to why some plants and some trees are considered more holy than others, again the reference coming straight from the Naulas itself. That's how important this Bowditch structure actually is.

One quick image I wanted to show, these are some of my students who are working in a place in Tehri district, which is adjoining to Kumaon and bowditch/Pauri and what you see is basically not a Naula. This is actually a spring water that has been trapped with a small kind of a check dam and the water is coming that you see feeds almost six hundred to eight hundred families, that water that you see and behind that you see is the Himalayas which is trapping the water and putting it inside that particular spring. If you observe carefully, I have to zoom in. I cannot show you right now. But if you observe carefully, you will find a barbed wire because this is the catchment of this particular Bowditch. There's a barbed wire that has been put up to protect the forest that is on top because our forest traps water that feeds six hundred families. So they put a barbed wire around that forest to ensure no animal, no human being goes and disturbs that forest. It's a community forest. When I kind of elaborate it, I was told by some locals that earlier there used to be a red thread that used to be tied around this forest and around specific trees that were large to protect them and to tell the people not to cut them because they were giving us water. This same kind of concept, if you extend it to the Peepal tree and the thread that we tie around it, can make a correlation. So, the idea again here is that all the temples. All the religion that we do in different parts of the country, all of it comes from Naulas and from the traditional knowledge of water management in the Himalayas, you can find your answers there. So that's something I want to highlight that the Himalayas are not just the Himalayas, everything else that we do in our country is also linked with the Himalayas.

One more aspect that I learned is the traditional method of locating the Bowdie, because this is water coming out naturally from the ground. There was initially and many people mentioned this, a traditional knowledge of exactly how to find this water source. Today that knowledge is lost. Nobody knows how to find about Bowdie. So it's just guess right now, people just say that here water is getting collected so let's make a Bowdie or a spring here, or check dam here. That's something we've already lost. If you observe more carefully structurally, we find a Naula has roof slopes on all four sides, which is not like a house but is definitely like how we make temples in the rest of the country and in Uttarakhand as well.

Something else I learned that step wells are Baolis which are found in the rest of the country I am sure all of you know what baolis are, perhaps also find the origin from the Bowdies or the Naulas in Uttarakhand. Like I said, it's not just the Himalayas. The entire country is connected to the Himalayas in interesting ways. Some that we understand, some that people not even understand. And finally, I conclude with the definition. The idea of is to share one particular method of water conservation, traditional method, and its links with culture, which is called Naula that comes from the state of Uttarakhand, which is in huge in danger because the people who used to make this are no longer existing and are dying very soon and the knowledge is not being passed on to the next generation. So with that, the Naula is a small structure with a roof and a porous floor which houses an aquifer from which water keep coming out and people come to drink water.

That's not all, that's only just one small example of the large number of ways of how we traditionally manage water in the Himalayas. I've mentioned a few more that you should know of. This is all from Uttarakhand and they call different names in different states based on where they are but essentially, they mean the same. So, it's called Dhara (spring). It's called a Gadhera, which is another method of a bit of the stream from which we drink water. We stop it and consume water. This is another structure which is called the Gul, which is for diverting water mainly for irrigation purposes. There's also something called Khals or Chals which is a bit for rainwater harvesting that we make on the mountain top. It stores all the water and recharge the the mountain and the springs then get recharged to bring the water to people. We have another term called Simar or Gajar, which is land saturated with water or marshy land. These were initially supposed to be the first hints of where a Naula should be made. We have a term called Chuptaula, which is basically a structure of pond which was created for grazing animals. Even animals are not left behind, it's not just human beings, even animals are taken care of. We have another term that's called Khaw, which is the lake created by incoming Dhara and Gadhera.

Many such structures exist, many such knowledge exist, but unfortunately is rapidly being lost and that's why we hear all these news items talking about great water crisis taking place in the Uttarakhand and other parts of the Himalayas.

Very quickly I can still do the last slide- challenges for water and traditional methods in the Himalayas, something that needs to be highlighted. So, what is happening, what is going wrong. So first, since climate change, we are still doing these studies. There is some data available. But it will take some more time to establish this, but what is clear and has been said for a long time is the fact that glaciers are melting at a huge rate. So earlier, because the heat was not so much, the glaciers would melt slowly, and water would be available all year round in the springs, in the various parts of the Himalayas. Right now, the glaciers melt very fast. Therefore, all this water flows down. In fact, it flows down so fast, sometimes it causes flood disasters. One key challenge we're facing is climate change, which is only going to intensify in the near future. Studies are ongoing, and will soon have more data to kind of understand how this impacts us and the Himalayas.

Second is big dams. Right now, big dams are causing a huge problem because they are putting a check on the flow of the river systems and these river systems in Himalayas, unlike in the plains, they also feed into the springs. They also feed into different traditional sources of water conservation, but when you put a dam and you check the flow of water, those traditional systems also go dry and I have not found much literature on that, we don't have that kind of understanding that what kind of impacts are big dams having or showing on the traditional system of water conservation of water harvesting in Uttarakhand and in other Himalayan states.

There's also unplanned and unsustainable tourism development as I just speak one sentence here and conclude. We are constructing flyovers. I have seen them myself. We are constructing flyovers in the Himalayas where we should actually be working with only sustainable architecture. I don't think I need to say anything beyond that. If you just google up or you make a search on youtube on disasters and landslides taking place, you will find it's not just mud and stone that fall. It's giant buildings and big hotels, six storeys, sometimes eight storeys that fall in the Himalayas, unfortunately, killing people very often. That's not the Himalayas fault. That's the fault of the unplanned or unsustainable planning that we have done, which is not in line with nature.

We also are now looking at mass scale migration and misplaced consumerism taking place in the Himalayas. Television and the internet have reached there, which is kind of expose the

people there to all sorts of technologies and all sorts of things which are not available in the Himalayas. As a result of what's happening, the lifestyle that they want is not available there. So, there's mass migration taking place, not now, for the last twenty years, and we now have 'ghost villages' in Uttarakhand. Villages that are empty because everybody has migrated and sometimes the migrations are permanent. They're not coming back. right. That's again, something that's very concerning because of migration you also lose traditional knowledge which is never going to be kind of return to that place again. Something that needs to be checked.

Finally, a last key challenge, Naulas or Bowdie that I've just shown you, versus the null or the tap. Every government that has come, not just this government, every government has tried to give tap water and pipe water supply to the people of the Himalayas. And I can understand that because as the government, it will be very, I'm not sure what the word is, but it will be very unsophisticated perhaps, if I tell the people to go to a Bowdie and consume water from there and not give them a null or a tap. But we find that very often these nulls or these taps or these pipe water supply, they often experience landslide disasters they break in between and people are without water. As a result, they have no option but to go to these Naulas from where they consume the water. So it's something that we need to work on. I'm not sure in which direction because it's a multifaceted challenge. But we need to work to ensure that we do have the taps but not at the cost of Naulas. They should not be lost.

So, some quick solutions, I think I can just share one, is that we need to work to do some sort of reverse migration. The small initiative that I have taken in that direction through research is to develop eco-tourism in Uttarakhand. So, look at home stays. Look at what can we do to ensure that we have a sustainable tourism taking place in Uttarakhand. That's one area we are working on. Like I said, the pandemic has kind of reduced, slow down our work. We are hoping for that to get over soon so we can resume. There is also another suggestion we want to give and I have shared this on some platforms, that we set up a permanent fund for the people there so migration can be stopped. And where can this permanent fund, the money come from, so big dams, when you construct, the companies who construct big dams are required to give money, some sort of a payment to the government, which is usually used in setting a pipe for the supply and whatnot as a means. But it can also be used to set up a permanent fund, some sort of an investment made in the market and the interest that comes from the permanent fund should be shared with the people. And while it sounds very out of this world, it happens in different parts in the world. An example of this is the Alaska Permanent Fund, where Alaska

discovered oil, they figured that oil is going to be lost very soon and how will the future generation fifty years down the line get the benefits, so they asked oil companies to come to mining, but they took that money. They invested in the markets, they put them in stocks and the interest that comes to the mining is used to pay every citizen of Alaska on an annual basis. So everybody who is living in Alaska today gets about one thousand dollars just for living in Alaska because their land is being used for the purpose of mining. The same argument can be extended in terms of big dams that are being constructed that bring huge damage to the ecology and the society of Uttarakhand, that money should somehow be given to the, that benefit should somehow be given to the people of Uttarakhand. So, one example is by setting up a permanent fund, the tools which are already available with different governments.

One more solution we would like to work on, in the future as a group is something called bioresource development or from promoting organic farming in Uttarakhand. We know that two things that are happening definitely right now, are called Go Vocal for Local. That is something that should reflect Uttarakhand for sure. And we have a Nagoya Protocol as part of the Convention and Biological Diversity at the UN, which have now a principle of Access and Benefit Sharing. It's called ABS that means if you take resources, genetic resources, herbs and whatnot from hills, from mountains or from any tribal belt or any belt where you have local indigenous people, the benefits should be shared with the people. We know today that lots of researchers are going on in the different parts of the Himalayas to find local herbs that have cure for different diseases. So that benefits should also come to the people of Uttarakhand as a small step to ensure that migration can be reversed and stopped.

So, few solutions, all with the focus that the traditional knowledge in terms of water conservation in terms of keeping the Himalayas intact is being lost and that's something we need to work to ensure that can be recovered and can be protected because if that knowledge is lost, it will not be coming back anytime soon. I think with that I would like to conclude with this one, folklore song that is often sung in the Kumaon Himalayas, which says "*Thando re thando, mere pahad ki hawa thandi, paani thando*" which means "Cool oh cool, the air of mountains is cool, and the water of mountains is cool". But on top you see a very sorry site from Shimla where you have people who have queued up just like we see this in Delhi sometimes with buckets and there's a water tanker that's come to feed these people. I'm sure there must be a traditional water harvesting structure close by, but that is being lost at an alarming rate.

Bibliography

Books:

- Aggarwal, R. (2002). *Water-sharing traditions in the Himalayas: Culture, conflict, and collaboration*. Oxford University Press.
- Bahadur, J. (2004). *The water heritage of the Himalayas*. Rupa Publications.
- Gyatso, G. (2011). *Waterscapes in the Himalayas: Sacred waters and traditional water management*. Wisdom Publications.
- Mishra, A. (1993). *The radiance of water: Traditional water systems of the Indian Himalayas*. Gandhi Peace Foundation.
- Mukherji, A., Scott, C. A., Molden, D., & Bharati, L. (Eds.). (2018). *The Hindu Kush Himalaya assessment: Mountains, climate change, sustainability and people*. Springer.
- Negi, G. C. S., & Joshi, V. (1996). *Traditional water management systems of the Central Himalaya: Village ponds and sacred springs*. Gyan Publishing House.
- Pandey, D. N., Gupta, A. K., & Anderson, D. M. (2003). *Rainwater harvesting as an adaptation strategy to climate change*. United Nations Environment Programme.
- Singh, R. B. (Ed.). (2006). *Water and climate change in the Himalayas: Changing scenarios and adaptation strategies*. Springer.
- Tambe, S., & Kharel, G. (2008). *Water conservation in the Indian Himalayas: Indigenous knowledge and practices*. Central Himalayan Environment Association.

Articles & Essays:

- Bagdi, G. L., & Pal, P. K. (2016). Traditional water harvesting systems in the Himalayan foothills: A case study from Garhwal. *Water History*, 8(1), 1-17. <https://doi.org/10.1007/s12685-016-0165-3>

- Banskota, M., & Chalise, S. R. (2000). Sacred landscapes of the Himalayas: A perspective on water conservation. *Mountain Research and Development*, 20(1), 43-50.
[https://doi.org/10.1659/0276-4741\(2000\)020\[0043:SLHWAC\]2.0.CO;2](https://doi.org/10.1659/0276-4741(2000)020[0043:SLHWAC]2.0.CO;2)
- Bhasin, V. (2012). Water management and rituals in the Indian Himalayas. *Asian Folklore Studies*, 71(2), 281-305. <https://doi.org/10.1142/S2010495212400027>
- Bhuchar, S. K., & Ning, W. (2012). Traditional water management practices and community participation: An assessment from the Himalayas. *GeoJournal*, 77(3), 315-328.
<https://doi.org/10.1007/s10708-010-9403-9>
- Chhatre, A., & Agrawal, A. (2008). Forest commons and local enforcement. *Proceedings of the National Academy of Sciences*, 105(36), 13286-13291. <https://doi.org/10.1073/pnas.0803399105>
- Mahapatra, A., & Das, A. K. (2014). Reviving sacred groves and springs in the eastern Himalayas: Traditional knowledge and water security. *Environmental Management*, 53(1), 51-63.
<https://doi.org/10.1007/s00267-013-0214-9>
- Pandey, A., Kumar, P., & Ghimire, S. (2005). Traditional irrigation systems of the Himalayas: An ecological and cultural assessment. *Mountain Research and Development*, 25(3), 231-239.
[https://doi.org/10.1659/0276-4741\(2005\)025\[0231:TISOHM\]2.0.CO;2](https://doi.org/10.1659/0276-4741(2005)025[0231:TISOHM]2.0.CO;2)
- Rautela, P., & Karki, B. (2015). Water conservation through sacred traditions in the Kumaon Himalaya. *International Journal of Sustainable Development & World Ecology*, 22(4), 345-356.
<https://doi.org/10.1080/13504509.2015.1031836>
- Singh, S. P. (2006). Traditions of water conservation in the Western Himalayas. *Journal of Environmental Planning and Management*, 49(5), 755-776.
<https://doi.org/10.1080/09640560600850043>

Reports & Guides:

- International Centre for Integrated Mountain Development. (2010). Water traditions of the Hindu Kush Himalayas: Community-based management and adaptation. ICIMOD. Retrieved from <https://www.icimod.org>
- Institute of Himalayan Environmental Research and Education. (2008). Traditional water conservation practices in the Indian Himalayas: A compendium of case studies. IHER. Retrieved from <https://www.iher.org>
- International Union for Conservation of Nature. (2013). Sacred waters: Linking water conservation and traditional knowledge in the Himalayas. IUCN. Retrieved from <https://www.iucn.org>
- United Nations Educational, Scientific and Cultural Organization. (2011). Conservation of mountain springs in the Himalayan region. UNESCO Publishing. Retrieved from <https://www.unesco.org>
- Water Resources Management Directorate. (2014). Sustaining traditional water systems in Himalayan communities: Policy perspectives. Ministry of Water Resources, Government of India.