

BISHNOIS OF INDIA: ANALYSING CHANGES AND THREATS TO THEIR PHILOSOPHIES AND LIVELIHOODS



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ABSTRACT

TEK (Traditional Ecological Knowledge) has been around for centuries, the values TEK holds in terms of nature conservation and sustainable resource use is being realised globally. Efforts to conserve it are on an increase today, while the knowledge is being lost to modernity. This knowledge is held by traditional/indigenous/local people who live close to nature and have direct contact with it for their daily livelihood. One such group/sect of people are the Bishnois of Rajasthan (India), known for their eco-friendly lifestyle and their drive to save wild animals and trees. They are sometimes also referred to as the first conservationists of the planet. Their conservation action goes all the way back to the 16th century. It was founded by their Guru Jambheshwar ji in the Thar desert of Rajasthan, he laid down 29 principles for people to follow in order to have a successful life. These rules were based on environment protection and sustainable lifestyle which have become an engrained part of the people of this community and even to this date they adhere them. Their conservation efforts and their drive to protect nature have intrigued people globally. Many famous documentary makers have highlighted Bishnois efforts in nature conservation. But as romanticism took over, many problems were overshadowed in the community. TEK is being lost globally, and India is no exception to this. With villages becoming towns and towns becoming cities, human reliance on nature is decreasing. Modernisation a necessary evil is penetrating deep into villages, luring people into so called a convenient lifestyle. Which leads young people of the community to leave their traditional livelihood and their knowledge behind and move to cities for better education and jobs. This change in their lifestyle, changes the values and philosophies of the community. The modern lifestyle of Bishnois is different from their ancestors, the adaptation in their lifestyle is leading to the loss of their practices, knowledge, values and TEK as whole.

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1. INTRODUCTION

1.1 Background

The IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) report 2019 concludes that nature's capacity to support the wellbeing of humanity is threatened due to various anthropological activities like habitat conversion and climate change (Díaz et al., 2019). The global decline of nature continues unabated, which is changing the life support system the earth along with the human society depending on it (Cardinale et al., 2012). The exponential human population growth with increasing unsustainable living habits is decreasing nature's capacity to provide us with resources, leading to a biodiversity decline which is faster now than at any time in the human history (Díaz et al., 2019). Regional conservation efforts by countries to protect individual species or ecosystems are significant but the main driver of biodiversity loss (i.e. overexploitation, climate change and pollution) are still increasing (Secretariat of the Convention on Biological Diversity, 2020). Nations have got together time and again, signed policies and made rules to help - curb the problem of biodiversity loss. In 2010 the UN (United Nations) declared 2011- 2020 as the decade of biodiversity. Including 20 targets known as Aichi Biodiversity Targets towards improvement of biodiversity. That is to reduce direct pressure on biodiversity and promote sustainability, to improve status of biodiversity by safeguarding ecosystems (Secretariat of the Convention on Biological Diversity, 2010). One of the objectives of the Aichi targets aims for integration of traditional knowledge (TK) innovations and practices, which are relevant for conservation and sustainable use of biodiversity with modern scientific community. (Secretariat of the Convention on Biological Diversity, 2020).

Traditional, indigenous, and local ecological knowledge (TEK, IEK and LEK) often used as synonyms, are known to be used as sources of knowledge about various species, ecosystems and the practices held by people living in close connection with natural environment (Freeman, 1992). Local knowledge of indigenous people of their regional ecosystem is the oldest scientific knowledge on the planet (Wilder et al., 2016). Indigenous communities and local people are known to make vital contributions for biodiversity conservation and sustainable resource use. Integrating their local knowledge into modern practices could benefit people globally (Secretariat of the Convention on Biological Diversity, 2020). Upto 85% of the world's protected area is inhabited by indigenous people and in some countries more biodiversity is found in indigenous reserves than in conservation areas (Weber et al., 2000). One quarter of the land surface is occupied by the indigenous people, and this 35% of land area is the one which has least human intervention (Díaz et al., 2019). The importance of traditional knowledge in biodiversity conservation and wildlife habitat protection is now being understood by scientists and conservationists and they are eagerly seeking ways to learn and collaborate with traditional/local people (Weber et al., 2000).

TEK can be defined as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmissions, about the relationship of living beings (including humans) with one another and the environment" (Berkes, 1993, p.3). Traditional/indigenous and local people are known to use resources sustainably and have protected their environment for millennia using their local knowledge (Gadgil et al., 1993). For example Ashantis of Ghana protect their forests from being cut for any anthropological use as these places are believed to be residence of gods and ancestors (Asante, Ababio, and Boadu, 2017), likewise

many tribes in the north-east of Thailand protect sacred sites which are believed to be an abode of a local god known as Don Pu Ta and individuals are selected from different communities known as Thao Cham who are responsible for caring and protecting the Pu Ta forest (Boonyong, 2000). Moreover Mapuche tribe of Chile is known for their precise knowledge of distribution of female Araucaria trees and their frequency of seed production leading to efficient native forest management (Herrmann and Torri, 2009). People living in close vicinity with nature value it more, such that the indigenous people's respect for nature and sustainable use of resources have succeeded in preserving and protecting earth's most fragile ecosystems (Beltran, 2011). Indigenous people's traditional system of natural resource management have been the main method by which these societies have been able to use these resources sustainably for millennia (Madhav Gadgil et al., 1993).

Apart from having a great cultural and social value to it TEK has systems that provides models for sustainable resource management and biodiversity conservation (Berkes et al., 1994). The importance of TEK in modern day science is high and there have been numerous cases that explain how integration of TEK can lead to constructive solutions related to conservation and sustainable resource use (Tengö et al., 2014; Drew, 2005; Higgins, 1998). Drew (2005) mentions in his study that TEK has drawn attention for becoming the basis of theoretical frameworks to build management and conservation plans by various biologist. It has been the central component of social-ecological systems of indigenous communities and local people that has been widely recognised to play critical roles in conservation practices worldwide (Moller et al., 2004). It is a result of experimentation, adaptation, and co-evolution over a long period of time. TEK can provide useful knowledge, methods, theories, and practices for managing ecosystems sustainably (Tengö et al., 2014). Even though TEK adapts and adjusts itself to the dynamic nature of social and ecological conditions. In recent years there have been increasing number of case studies from across the world that provide evidence of rapid degradation of the traditional knowledge (Tang, 2012; Gómez-Baggethun and Reyes-García, 2013; Oteros-Rozas et al., 2013). Loss of tradition impacts the community/tribe socially and culturally, but this loss also impacts their ecological practices. As TEK plays an important role in management of natural resources, its degradation can lead to harmful impacts on biodiversity (Berkes et al., 2000).

1.2 Context of the study

Focussing on the Bishnois of India

India is a diverse country, consisting of various ecological landscapes with diverse flora and fauna. It has managed to retain species wiped out from most part of the earth (Bindra, 2017). Despite all odds, India is one of the 12 mega biodiverse countries in the world, as many people in India still directly depend on nature for its use and these people help conserve biodiversity (Gadgil, 1993). Some indigenous tribes and local communities have lived with nature and maintained harmony with it from time immemorial (Berkes, 1993) . Indian people's religious beliefs had set an ecological harmony with nature centuries ago and this spiritual relationship between humans and nature is one of the reasons for India's high biodiversity here (Kala and Sharma, 2010). However, growth in human population and exponential rise in the economic status of Indian has posed a threat to its biodiversity (Ghosh-Harihar et al., 2019). Around 5.1% of the land area in India is protected but the human population is so enormous that about 4 million people live in these protected areas, leading

to increased number of human-wildlife conflict (Narain et al., 2005). With more development projects like construction of buildings, roads, train lines etc. The already small, protected areas are getting fragmented even more (Crooks et al., 2017), found that habitat fragmentation in India is extensive. In India Around 8% of the population is tribal (Xaxa, 1999), who live in close contact with nature. These tribal people are the ones facing problems due to development. Traditional Indian beliefs have led local and indigenous communities to respect and protect nature (Kala and Sharma, 2010). These communities exist even today and one such community is called the Bishnois.

Bishnois is a sect of people living in the north-western part of India. They live mainly in Rajasthan but also in some adjoining states of Gujarat, Madhya Pradesh, Haryana, and Punjab (Fig-1). There are close to 1 million Bishnois in total across India (Reichert, 2015). They are primarily an agrarian community, and their culture has principles of species conservation and protection (Hall, 2011). In recent years, Bishnois have been moving to cities to find better jobs and better schools but most of them are still engaged with agriculture (Reichert, 2015). Mainly living in the state of Rajasthan, which is also the most populated desert landscape in the world. Even though being extensively arid the biodiversity of the region is high. Which could be partly due to the presence of various landscapes but the protection provided to the local biodiversity by the Bishnois plays a huge role in it (Gehlot and Moolaram, 2017).

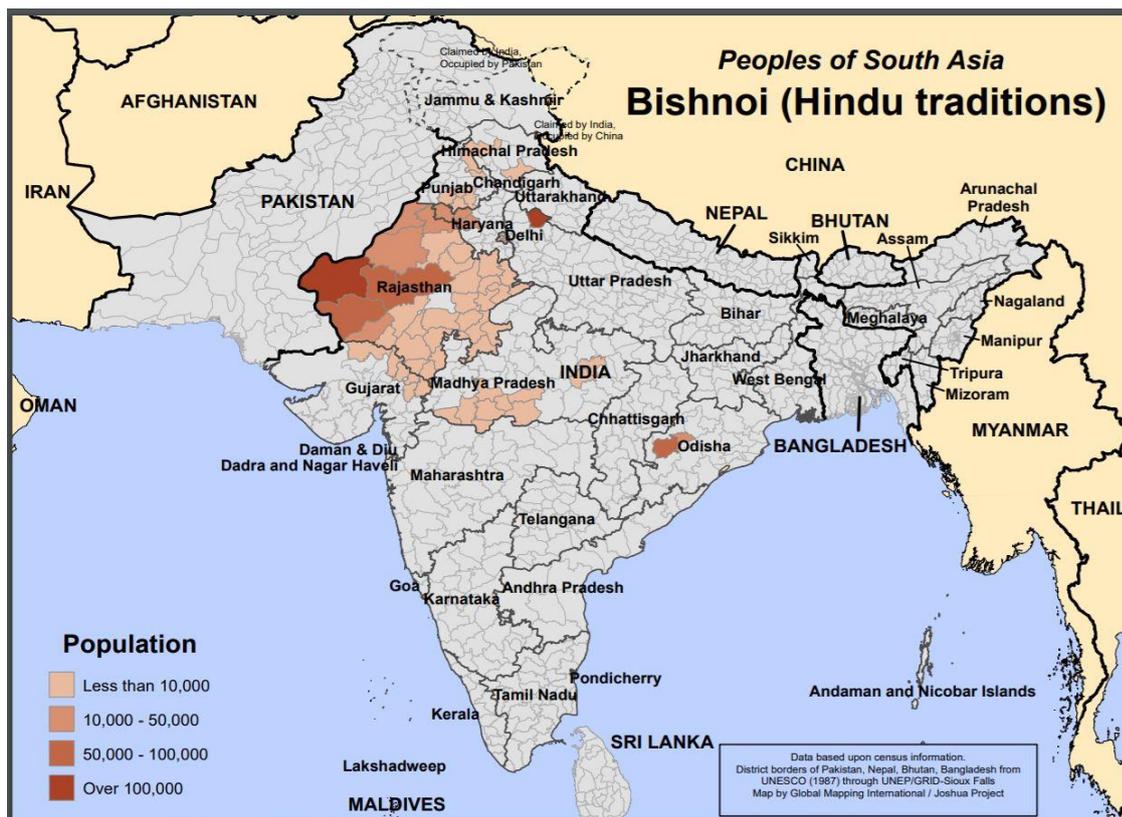


Figure 1: Source: <https://joshuaproject.net/peoplegroups/16464/IN>. Retrieved April 5, 2020

Bishnoism started in the year 1485 AD when a visionary saint Guru Jambheshwar Ji (also known as Jamboji) founded this eco-friendly sect, on a sand dune known as Samrathal Dhora in the Thar Desert, Rajasthan India (Fig-2). He observed a severe 10-year drought in late 15th century, he saw

animals and resources being stripped apart and destroyed. It was during this time when he had a vision to encourage a better relationship between human and its nature which led to emergence of his teachings by establishment of the 29 rules (Reichert, 2015). The sect emphasized peace and harmony with all living beings like animals and trees (Aryal, 2014). Though Bishnoi is a separate sect with their own rules, the basis of this sect comes from Hinduism and these teachings are central to Bishnoi beliefs and practices (Reichert, 2015). (P. Jain, 2011) finds out that Bishnois practices are not just limited to the teachings of Hindu scriptures and rituals but instead it goes beyond them and includes preservation and protection of natural resources, animals and trees, which is the reason for their activism in protecting nature. This sect is guided by 29 principles/rules laid by Jamboji, that are followed by all community members, not only that but the name Bishnoi itself means 29 (Bish 20 and Noi 9) in Rajasthani dialect of Hindi language (Reichert, 2015). Of the 29 principles, eight of them are dedicated to environmental protection (*in-detail in Table-1*) which included not cutting green trees, protecting wild animals, providing them shelter etc. Seven rules dedicated to good social behaviour were directed for followers to be truthful, pure, and not to lie. Ten rules for maintaining good health and personal hygiene by improving personal sanitation conditions, bathing daily, maintaining cleanliness and purity, and restricting the use of any narcotic substance. Four other rules were dedicated to spiritual practices including performing fast and fire ritual (*havan*) on every new moon and some other daily rituals (Jain, 2011). Apart from these 29 principles there are 120 *shabd*s or statements in which his teachings are preserved and there he cautioned people against harming animals and encouraged his followers to protect trees (Jain, 2011). By following these rules Bishnois have transformed their lifestyle into a religion of environment conservation (Kala and Sharma, 2010).

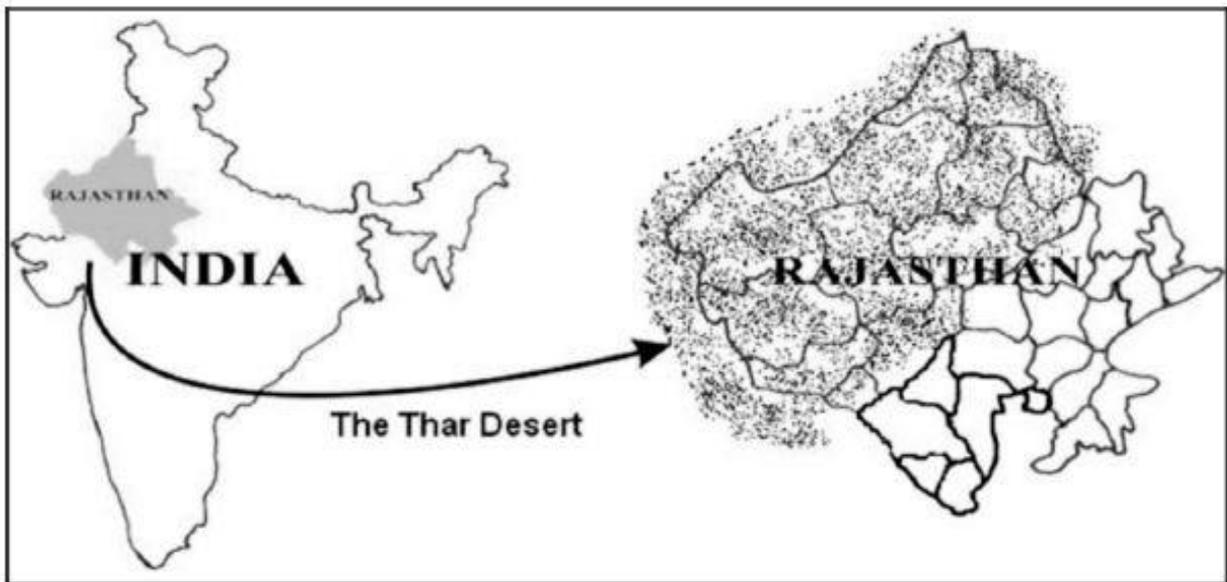


Figure 2: Thar Desert, India (Bikku, 2019)

Rules for environment protection:	Brief explanation
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1. Filter water, milk, and firewood (to prevent killing and burning insects)	Bishnois take care even of the smallest living organism and they filter their drinks and firewood before burning so they can avoid killing any small insect.
2. Have pity on living beings and love them.	Bishnois take care of any living organism either human or animal (domestic or wild) equally. They help protecting wild animals and help protect wild areas.
3. To be compassionate	Bishnois are compassionate to everyone, and they help whoever is in need. They provide food to people who are in need and to animals as well. Not only that but they also donate a specific amount from their earnings regularly for any good cause.
4. Do not cut green trees, save environment.	This is one of the most important rules of Bishnois. Trees are lifeline for Bishnois in the harsh environment they live in, and they realised it hundreds of years ago. They never cut a tree and plant trees whenever they have a chance.
5. Provide shelter for animals so they can complete their life with dignity and do not get slaughtered.	Bishnois have made animal shelters across the villages they live, and they take care of injured or abandoned animals and release them in wild when they recover.
6. Do not sterilize ox.	As all living organisms are a part of environment and putting someone through pain is hurting the environment according to Bishnois. They restrict causing pain to animals in any form.
7. Do not eat meat, remain pure vegetarian.	Bishnois are completely vegetarian, and their diet mostly contains grains, fruits, vegetables along with cow/buffalo milk and these animals are taken care by Bishnois.
8. Never use blue clothes or blue colour extracted from indigo plant	Bishnois avoid wearing blue clothes as it used to be extracted from indigo plant which makes the soil dry and in order to avoid that happening, they avoid wearing blue clothes.

Table 1 Rules for environment protection (Jain, 2011)

Bishnois stringent conservation efforts gained them an image not only in India but globally as well (Reichert, 2015). Their dedication towards environment protection can be seen in the quote given by their leader Guru Jambeshwar ji saying *“Sarsanteyrukhrahe to bhisastojan”* which translates to “if a tree is saved even at the cost of one’s head, it is worth it” (Gehlot and Moolaram, 2017). They are so rigorous with the rules that, 363 people gave their life away in order to protect trees from being cut (Gehlot and Moolaram, 2017). Known as the Khejrli massacre, in 1730 the King of Jodhpur region of Rajasthan Abhay Singh sent his soldiers to cut Khejri (*Prosopis cineraria*) trees to build a temple. When the soldiers approached to cut the trees a fierce Bishnoi women Amrita Devi approached to a tree and hugged it and said, “if a tree is saved from felling at the cost of one’s head, it should be considered as a good deed”. She was beheaded in front of her daughters and all the kids, women

and men who followed Amrita met the same fate, the soldiers decapitated all of them (Reichert, 2015). Bishnois environmental principles serve as a platform to see the impact human culture can have on the non-human species even in the human dominated area. Bishnois are known for sacrificing their life for defence of wild fauna and trees, their conservation efforts are praised all around the world. The history of self-sacrificing in defence of nature is enormous. Some recent examples of their efforts are in December 1977 Shri Birbala ram Khichar of village Lohawat, Jodhpur died while saving a gazelle's life. Shri Dhokal Ram Mal sacrificed his life to save a deer species in Rotu village in 1947 and many more incidents are recorded (Gehlot and Moolaram, 2017).



Figure 3: Painting at Khejadali Temple, artist unknown. Published in Reichert (2015)

Bishnois are one of the oldest conservationists in the world and their conservation efforts can be seen even today (Aryal, 2014). For instance, in the month of May 2020, a 15-year-old school going boy along with his two friends bravely fought against two armed poachers after hearing a gunshot fired in the middle of the night. The three youngsters managed to overpower the poachers and they had to leave the place leaving their arms behind (Jain, 2020). Rana Ram Bishnoi, a 75-year-old man from Jodhpur, has been planting trees for the past 50 years in his region and managed to plant more than 27000 trees. Where the world is fighting climate change and finding ways to curb the rising temperatures, this man is on a personal mission (Chauhan, 2019).

Bishnois consider themselves as a part of nature (eco centric). They have evolved their lifestyle into a religion to protect nature and one of the basic philosophy of Bishnois is that- all living things have right to live and share resources (Kala and Sharma, 2010). White (1967, p-1205) says about human nature relation that- 'what people do about their ecology depends on what they think about themselves in relation to things around them'. Where people globally satisfy their needs by living in

an anthropocentric world, Bishnois are known for living in harmony in an eco-centric way. The basic philosophy of Bishnoi faith is that all living forms have a right to live and use the resources, and humans should try to minimize harm done to other living organisms (Gehlot and Moolaram, 2017). Despite their stringent conservation policies. Bishnois are a prosperous agrarian community who live mostly in villages but are politically and economically active, they are one of the wealthier communities amongst others and hold several political offices in and around the city of Jodhpur (Hall, 2011).

1.3 Problem statement

Since the literature on Bishnois is limited and they are understudied (Reichert, 2015), not much is known about their status of livelihood and knowledge. As modernization pose a threat to TEK due to reduced reliance on traditional lifestyles, through integration into markets for easy access to commodities or a shift in commercial production (Tang and Gavin, 2016). Due to modernization traditional livelihood across the world is on a decline and Bishnois are no exception to it. Not only the loss of this knowledge system can affect local livelihood but overtime it may result in changes to ecological knowledge and management of natural resources in the local region (Tang and Gavin, 2016). Which means that cultural and biological diversity is connected, to which Reyes-García et al. (2013) say that both the biological and cultural diversity of the world is on a decline.

TEK is in danger today (Laureano, 2008) and there have been many studies providing evidences of rapid TEK decline in recent decades as shown by Tang (2012). Boyd and Richerson (2005) found that many drivers are responsible for cultural change and the rate at which it changes varies across different cultures and time periods. Therefore generalization of factors for loss of TEK among different indigenous/local communities is not feasible. Tang (2012) showed that most of the current TEK research concentrates on specific communities and locations. Bishnois are a different sect of people from Hindus even though their teachings come from Hinduism, but they have their own lifestyle, cultural practices, and traditional knowledge system. What makes it difficult to find about the loss of their knowledge is that the literature on Bishnois is thin (Reichert, 2015). Tang and Gavin (2016) found that a comprehensive understanding of the drivers of TEK change and conservation lacks in most locations, and that is why it is important to study about the loss of TEK for Bishnois comprehensively.

There is evidence of sustainable lifestyle of Bishnois and how they conserve their local biodiversity. But their practices might have changed over time. In this thesis I will firstly try to find how sustainable Bishnoi lifestyle is. Secondly, I will try to gain insights into their present-day livelihood and their ecological practices also to what extent these practices can be termed as TEK. Finally identifying threats (if any) to their livelihood and knowledge from a lens of TEK.

1.4 Research questions:

Main research question:

To what extent are present day philosophies and livelihoods of the Bishnoi community in India subject to change, are their practices underpinned by TEK and can their livelihood be identified as ecologically sustainable?

Sub-questions:

1. How Bishnoi community and their present-day livelihoods can be characterised in social scientific sense and how do cultural changes and adaptations take shape?
2. To what extent are Bishnoi's philosophies and livelihoods underpinned by TEK?
3. To what degree can Bishnoi's philosophies and livelihoods be characterised as ecologically sustainable?

2. THEORETICAL BACKGROUND

This chapter gives a detailed description about the theories used throughout the research, with reasons for choosing the theories. Subsection 2.1 describes the theories used in the study. Later in subsection 2.2 a conceptual framework is constructed to make the reader understand how theories are applied in this study.

2.1 Applied theories

Bishnoi livelihood and their practices are studied by a few researchers, and they have categorised their practices according to their understanding. For example, Hall and Hamilton (2014) said that Bishnoi practices are a form of religious conservation. Another study conducted by Hall and Chhangani (2015) conclude that Bishnois have been performing a type of community based conservation. Whereas Bikku (2019), mentioned that Bishnois acquire ecological knowledge from their ancestors and continue it today for conservation and sustainable living. Finally, Kala and Sharma (2010) explain Bishnoi practices as traditional conservation. In this plethora of concepts, I will link Bishnoi knowledge and their practices to the components of TEK as TEK is a widely recognized terminology used in many international forums and international governing bodies (e.g., IPBES, GBO, Report of the world commission on environment and development etc.) and its importance is known and shared globally throughout these organisations. Not only TEK is widely known but the discussions for protecting this knowledge system and people who hold them have also been going on. As TEK is being lost globally and it could be the case with Bishnois as well. For this reason, my work aims to highlight Bishnoi efforts as TEK.

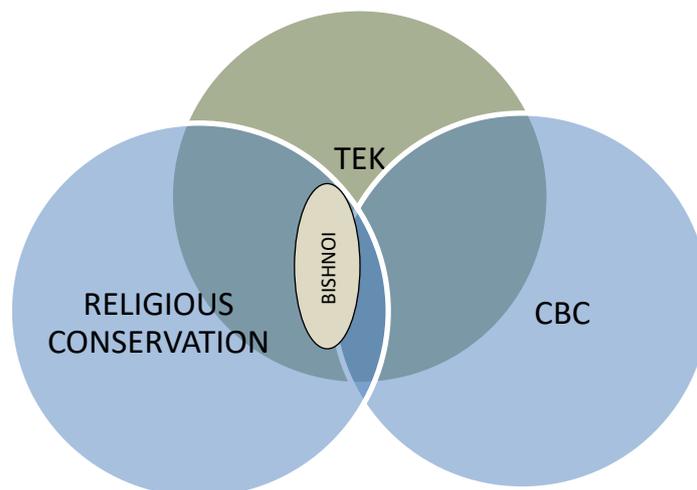


Figure 4: Area of focus

Traditional Ecological Knowledge (TEK)

Before diving into TEK we must know who these indigenous and local people are. The United Nations recognizes self-identification as the key requirement for people to be indigenous or belonging to a local community, these people include communities and tribes who self-identify as indigenous to the places they occupy and who organize their own traditions, customs, and laws. Whereas local communities are groups of people who maintain an inter-generational connection with the nature of the place through cultural identity, livelihood, worldviews and ecological knowledge (Hill et al., 2020). These indigenous people are motivated to utilise the available natural resources but they use it in a sustainable manner so they can conserve them for later use and so are the Bishnois (Bikku, 2019; Kala and Sharma, 2010).

Therefore, the main concept for this thesis will be TEK also known as Local Ecological Knowledge (LEK)/Local Knowledge (LK)/ Traditional knowledge (TK). TEK plays a great role in human-environment relation because of its ecological perspective of working with the local/indigenous knowledge is an essential component for inclusive assessment of human nature interaction (Hill et al., 2020). Although the term TEK came into use in the 1980's, the practice is as old as hunter gatherer times. Traditional ecological knowledge is an ambiguous term, where traditional usually refers to cultural transmission and continuity of social attributes like beliefs, principles, behaviour and practice derived from historical experiences. On the other hand, ecological knowledge if defined as a branch of biology, is already a domain of modern western science and if we define TEK in these terms then there can be no TEK. If the ecological knowledge consists of knowledge that includes relationships of living beings with one another and with their local environment, then the term TEK becomes usable. Then we can come to a usable definition of TEK which can be defined as "a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and their environment" (Berkes, 1993, p.3). Further, TEK is an attribute of societies with historical continuity in resource use practices; by and large these are non-industrial or less technologically advanced societies, many of them indigenous or tribal (Berkes, 1993). Another workable definitions of TEK is from Freeman (1992) who expressed TEK as a form of knowledge which is directed towards gaining useful understanding of the working of ecological systems, how key components of the ecosystem interrelate, and how predictive outcomes in respect to matters of practical concern can best be effected. For Huntington (2000), TEK is the knowledge and insight which is acquired through extended period of observation of either an area or a species, which may include knowledge passed down in an oral tradition, or shared among the resource users. TEK acts as an adaptive system which adjust accordingly to the dynamics of social and ecological conditions in which knowledge is embedded (Tang and Gavin, 2016).

The benefits TEK have for a sustainable livelihood has got a lot of attention in modern times lately and it is continuously increasing for the past 20 years (Baker, 1992). The Reasons for TEK gaining popularity in modern times is because it is an integrated form of knowledge, beliefs, practices and is an operational knowledge has a validation due to its long time series of observation on specific ecosystems (Berkes et al., 1994). Various authors have described TEK as "diachronic" observations where a local ecosystem is used for longer times for provision of resources while conserving and enhancing biodiversity in some cases (Madhav Gadgil et al., 1993). These values TEK holds has led global organizations to realise its importance and it thus has been included into biodiversity targets.

The relevance of TEK for sustainable management of various ecosystems is recognized by various international agencies (Secretariat of the Convention on Biological Diversity, 2020; Secretariat of the Convention on Biological Diversity, 2010; Díaz et al., 2019). TEK is known to be different from modern scientific knowledge in the aspect of ecosystem management, where humans are considered as a part of nature which may be considered completely alternative to current western world scientific knowledge. Also western science until recently, emphasized on exploitation efficiency of resources for monetary terms whereas TEK revolves around sustainable resource management (Berkes et al., 1994). Deep ecologists believe in preserving nature for its intrinsic values, where humans have been considered as an obstruction in it (Sessions, 2016). This concept of nature conservation with protected areas free from humans, is not feasible in a country like India as it is a western model of conservation. It is difficult to transplant it in such a country where the society is dominated by rural people making a living by using resources close to the nature (Madhav Gadgil et al., 1999). Indeed, these nature reserves does the opposite of what they are intended to do by moving away the people from nature, creating a problem for their sustenance. There have been enough evidences of how these conservation programs impacts local people in a negative way (Arjunan et al., 2006; Kala and Maikhuri, 2011). Here people consider themselves as part of the nature especially for indigenous and local people these areas are their home and they have made a balance with the nature for centuries and communities like Bishnois are a living example of that (Jain, 2011).

Ecological sustainability

What is sustainability and why do we need to conserve ecology? The concept of sustainability was highlighted in public in 1987 after the Brundtland commission. According Lele and Norgaard (1996) sustainability is nothing but the ability to maintain something undiminished over a period of time. Whereas ecological sustainability refers to the capacity that the biosphere holds to meet the needs of the present generation, without affecting future generations to meet their needs (Bikku, 2019). This means not to overuse the resources available in a short span but to use them in a limit, so it can be used later as well. The reason why scientists, politicians and countries are coming together and forming rules on sustainable use of resources and conserving biodiversity is because it is believed that human beings have the capacity to exhaust natural resources which will leave nothing for the future generations but an exhausted overused planet. Countries setting targets to reduce their carbon footprint, increasing their forested areas etc. indicates humans need measurements and rules to maintain a healthy planet. To that history has been evident, that in any community or society, conservation practices could only be sustained once strict rules and limitations are followed by the people. Emile Durkheim (1912(2008)) says that strict rules and restrictions imposed over a period results as beliefs and ethics, which plays a significant part in the ecological sustainability in any given environment. These principles then becomes an integral part of the life for the individuals and they follow it in their daily life.

Communities in India have been following certain principles which are tied to their ethics and have been going on for generations. Communities and tribes have sacred groves, a patch of land where any illegal activity like hunting, tree felling or extracting resources is prohibited. These communities are dependent on natural resources for their survival and their religious beliefs and practices conserve the biodiversity (Bikku, 2019). The Bishnoi community follow the same trend, they

conserve their local biodiversity, they do not overexploit the resources and live-in harmony with nature.

Modernization

According to Inglehart and Welzel (2007) modernization is an encompassing process of massive social change that, once set in motion, tends to penetrate all domains of life, from economic activities to social life to political institutions, in a self-reinforcing process. According to them most descriptions of modernization start with technological and economic changes. Historically speaking as long as human societies did not completely control the environment, we lived in a state of equilibrium the thought of human growth seemed unrealistic (McNeil, 1990). Societies stayed in equilibrium with nature until economic growth began. But soon the idea that technological innovations would enable societies to overcome the limitations imposed by nature on them gained credibility and then modernization was inevitable, it starts with technological and economic changes, altering social structures, cultural values and political structures of a society (Inglehart and Welzel, 2007). Nolan and Lenski (1999) say that economic production is the main component of human activities and changes in economy initiates changes in all other domains of social life.

A dramatic growth of scientific knowledge and technological advancements was seen in the beginning of 20th century in the western nations which changed political, economic, and social life of the people there. Whereas in India gained its Independence in 1947, led to enthusiastically welcome western ideals of modernization and development (Kashyap, 2004). Soon India realized that western technologies cannot be easily implanted on traditional social structures and norms because it not only required a structural transformation of social, economic, and political aspects but a change in the belief system, values, and way of life as a whole (Jha, 1985). This impact of modernization on the way of life and belief system affected even the Bishnois, with development reaching every corner of India and people out migrating to places for better life, Reichert (2015) says that modernization will continue to have a serious implication on Bishnoi tradition and values with time. Bishnois values and ethos are connected with nature, their everyday starts with feeding the animals and watering the plants and because of these values, Bishnois have been able to save biodiversity in their region leading to a significantly high number of flora and fauna compared to other regions around (Gehlot and Moolaram, 2017), but with modernization reaching every corner of the planet it may affect their lifestyle and practices which can further impact the biodiversity of the region.

The traditional livelihood of Bishnois is said to be ecologically sustainable (Bikku, 2019) whereas their dedication towards nature conservation are widely known, but the current impact of modernization could have an impact on their knowledge and lifestyle. Here I will try to integrate these theories to define contemporary situation of Bishnois in terms of livelihood changes and to what degree modernization have an impact on them, what it means for the biodiversity of the region and how the TEK is carried onto the future generations.

2.2 Theoretical Framework

The theoretical framework looks at the traditional knowledge of Bishnois and see if their practices are ecologically sustainable and can help conserve biodiversity. Though it has been pointed out by

some researchers that Bishnoi lifestyle is in a way sustainable (Vajpai, 2020; Alam and Halder, 2018; Kala and Sharma, 2010), I would like to find out exclusively that is that the case and how the current generation of Bishnois are keeping up with the traditional lifestyle. Which leads us to find about the subject to change, if any to their lifestyle/knowledge are subject to change and what are the reasons behind the change.

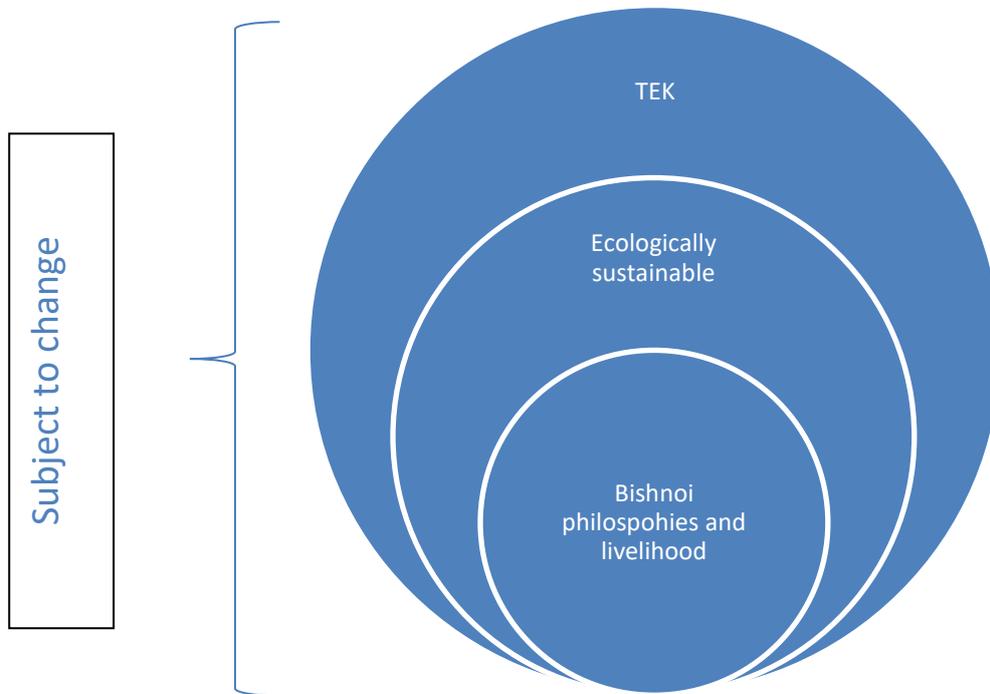


Figure 5: Theoretical framework

TEK is briefly described above in the theories part, but here I will explain the importance of TEK in detail and TEK's difference to modern scientific knowledge. Later in results I will explain the lifestyle of Bishnoi and how it relates to TEK. The reason behind trying to categorize the Bishnoi knowledge as TEK is that TEK has gained global recognition for its importance. The relevance of indigenous knowledge for sustainable management and use of resources is not only recognized by a few scientists but international agencies like WCED, IUCN, WWF and UNEP as well (Berkes et al., 1994). The under recognition the Bishnoi community has in the academic world can be lifted with this attempt to categorize their knowledge as TEK. Since there is a thin literature on Bishnois and not everyone knows about them even though their effort towards nature conservation is immense but not much noted in the academic world. I believe by categorizing their knowledge and efforts as TEK, could help shine some light on their efforts, which can help them gain recognition and their methods be included in decision making for ecological sustainability and nature conservation.

Importance of TEK

Brundtland Report, 1987 of the United Nation World Commission on Environment and Development, recognized the importance of the role of Indigenous people in sustainable development and resource management. The report acknowledged that these communities are repositories of vast accumulations of TK that they have developed through generations, by practicing a long trial method which made it possible for them to manage very complex ecological systems (Higgins, 1998). One must not forget that much of the world's biodiversity has been in the hands of traditional people who are agriculturists, hunters and gatherers, herders etc. for generations (Berkes et al., 1994). TEK is important for its social and cultural value, but also for practical reasons, many of them relevant to biodiversity conservation (Higgins, 1998).

Berkes (1993) explains the importance of TEK which he adapted from the IUCN programme on Traditional Knowledge for Conservation (IUCN, 1986) in the following points:

- TEK offers new biological knowledge and ecological insights.
- TEK can be used in environmental assessment.
- TEK is relevant for protected areas (PA's) and conservation education.
- Some TEK systems provide models for sustainable resource management.

In addition, a new-found awareness about TEK in the western society is that it can enhance their appreciation of the cultures that hold this knowledge, also recording of such knowledge is significant in the political world as a tool for social change.

TEK is a complex knowledge form that comes from undertaking activities like a particular form of agricultural technique or hunting or collection of medicinal plants or spiritual ceremonies over a longer period. These activities and techniques help connect indigenous people to the natural world and these interactions, carried out over many generations becomes TEK (Drew, 2005).

Difference between TEK and western scientific knowledge

TEK is important for the sustenance of traditional livelihood and the existing culture of the people whereas the Western societies are increasingly disconnected from nature as they are not linked directly to natural resources anymore (Levi-Strauss, 1962). TEK indicates that local/indigenous communities rely heavily on natural resources, and their knowledge and skills relating to resource use management. As mentioned before that TEK is based on long time-series data is because it takes trial and error for a substantive knowledge to exist in a community. Just like a certain method of water conservation would work in a desert landscape for a community the other methods would eventually fade away and the one that worked will pertain in the next generations. Therefore indigenous/local people who retain TEK are holders of a crafted knowledge for centuries that they gained by completing specific tasks in their respective environments (Berkes et al., 2000).

TEK is location specific, in remote areas where the sites are poorly studied the indigenous people may be the only source to get the local biological information (Drew, 2005). To this Berkes (1993) shares number of substantive ways TEK differs from western scientific knowledge, like:

- TEK is moral and western knowledge is not.
- TEK is based on long time-series data whereas western scientific knowledge is short time series.

- TEK is mainly qualitative whereas western science is quantitative.
- TEK is holistic compared to reductionist.
- TEK is based on data generated by resource users themselves compared to specialized cadre for researcher.

A major way in which TEK can be distinguished from western science is that TEK is not merely a system of knowledge and practice, but it is an integrated system of knowledge, practice, and beliefs. Therefore, maintaining indigenous cultural identity and practices are an important factor of TEK for indigenous/local groups. For example, for many North American aboriginal groups, hunting is not just a method to collect food by using their knowledge about the animal and the environment, but it is a process of a religious activity (Preston, 2002). The interlinkage of tradition and culture of an indigenous community with the ecological aspect is important to know as well, and with the Bishnoi community these aspects are not just interlinked but are engraved. Not cutting green trees and saving wild animals are not merely the ecological aspects of the community but it is a part of their culture and tradition.

Practicing Ecological Sustainability

Indigenous knowledge and its relevance to sustainable development is being recognized by scientists and social researchers now. Not only the positive effect that traditional knowledge system have on local ecosystems is recognized, but how it can play a role in the formulation and implementation of sustainable projects in developing countries (Lalonde, 1993). Inglis (1993) found that for ecologists, TEK offers a means to improve research and resource management of a given ecosystem. Livelihood of tribes or indigenous communities can offer modern societies many lessons in the management of resources in various landscapes from dense forests to mountain terrain all the way to deserts (WCED, 1987:12). Such are the Bishnois aspects of life, here comparison of their lifestyle will be done while keeping TEK in perspective as explained by Berkes (1993). He says that “TEK is not merely a system of knowledge and practice; it is an integrated system of knowledge, practice and beliefs”, and this system of knowledge is relevant for contemporary natural resource management. What the Bishnois have been doing for the past 500 years while living in the arid region is a type of natural resource management. They have managed to survive on the minimal resources available and not only that, but they have added to the biodiversity of the region by protecting trees from being cut and saved animals from being poached (Sinha and Singh, 2020). With Bishnois stringent rules of environment protection, they have showed the world how skilled they are when it comes to natural resource management. Not only their settlements are haven for wild animals and birds, but since their effort came into lime light, tour operators in the region have collaborated local NGO’s and started offering ‘eco-cultural tours’ (Lee and Schaaf, 2006). Which could help other people to learn from Bishnois about their eco-friendly lifestyle and nature conservation. Bishnois are known to protect their local biodiversity, but to find out if their efforts are the same in contemporary time, I tried to find that in my study. As India had a lot of influence by western lifestyle and so did the Bishnoi community, changes are expected to be in the society. The modern education and the constant development have led people to move to cities in search of jobs and an economically superior life and this influence of western media and consumerism has drastically changed Bishnoi lifestyle (Reichert, 2015). This change in lifestyle would have an impact on the local ecology, not only that but this can also affect the transmission of this knowledge to future generations leading to greater impacts both socially and ecologically.

Bishnoi livelihood and philosophies

I have explained about Bishnois in the context of study above, but here I will try to focus on their livelihood and philosophies. The basic philosophy of Bishnois is that “all living beings have a right to live and share resources so we as humans should try to minimize the harm done to other creatures as much as possible” (P. Jain, 2011). The eco-friendly sect revolves around environment conservation and they have been following this lifestyle for centuries (Bikku, 2019). Where they try to minimize their impact on the surrounding environment and make the landscape open for other animals as well to cohabitate. As explained by Jain (2011), he said “As my car drove on the state highway, I was suddenly struck by a huge number of deer freely grazing on both sides of the highway with the entire land protected by fences and notices placed by the department of forests. I later came to know that this was one of the famous sanctuaries for blackbucks, one of the animals traditionally protected by the Bishnois. Even as the biodiversity is increasingly endangered in other parts of India and the world, the biodiversity of the desert state of Rajasthan is managed not by human isolation but by active human participation, Bishnois being one of the prime examples of it.” A similar kind of experience has been shared by other researchers during their visit to Bishnoi villages as well (Reichert, 2015; Hall, 2011).

As Bishnois are primarily an agrarian community but just like many other people across the world some Bishnois have moved to cities in search of better education and jobs. Still majority of Bishnoi people continue to live in villages in a traditional way (Reichert, 2015). Out of the 29 rules Bishnois follow, taking care and feeding of abandoned or injured animals is one of the basic philosophies. Not only that but each Bishnoi family is required to give 10% of their harvest for wild animals and birds (Reichert, 2015). Many Bishnoi temples have animal shelters that are run by donations given by Bishnoi people. These shelters are made by the joint effort of the community and are taken care by the community as well. With this close connection of Bishnois with nature makes it clear that Bishnois life is engrained with nature. The role environment plays in a Bishnoi’s life is huge, their life revolves around their local biodiversity. But as modernization is making its way deeper into villages and people moving out from villages to towns and cities, the traditional livelihood and philosophies are hindered, and this lifestyle is under subject to change.

Subject to change(threats)

Tang (2012), said that in recent decades there has been an increasing number of case studies globally that provide evidence of TEK degradation. This could also be the case with Bishnois. Here I have taken the direct threats to TEK as discussed by Tang and Gavin (2016), and modified it according to my research purposes. I have categorised threats that could lead to the loss of their TEK into 3 categories and further into 8 sub-categories.

S.no	Categories of threat	Sub-categories
1.	Change of traditional livelihood practices	Reliance on modern products and/or techniques
		Reduced land-based activities

		Influence induced by formal education system
2.	Loss of pathways of TEK transmission	Loss of traditional language
		Younger generation's absence from the traditional community
		Influence induced by dominant societies and reduced incentives and interests in TEK
3.	Change of traditional religion and beliefs	Influence of other cultures and lifestyles
		Loss of traditional beliefs

Table-2: Modified from Tang and Gavin 2016

1. **Change in traditional livelihood practice:** changes can occur if there is a reduced dependence on traditional livelihood practices. For example, people depending on supermarkets for food rather than growing their own or a community who mainly depends on fishing for subsistence moves to consuming supermarket food. i.e., reliance on external products which can either be food or technology instead of indigenous methods/products.
2. **Loss of pathways of TEK transmission:** TEK is continues only when it is subsequently passed through generations and the medium of knowledge transmission is languages and if a language is lost, so is the knowledge (Maffi, 2001). Introduction of formal education, movement of younger generation away from villages in search of jobs/education or getting influenced by other dominant cultures can lead to loss of TEK.
3. **Change of traditional religion and beliefs:** Influence from other cultures and traditions can lead to loss of traditional religions and beliefs.

As already known that Bishnois are not thoroughly studied and not much is written on their knowledge being lost in modern time. But Reichert (2015), shares a brief chapter about the generation divide in the contemporary moment and writes about the changes in present Bishnoi lifestyle. Where she talks about how a Bishnoi family feels disconnected after moving to city and are nostalgic about their way of life in the village.

Here I will try to study livelihood and practices from the perspective of modern Bishnois. What do they think about their current lifestyle, do they feel any change in it when they compare it to their ancestors and differences one faces when they live away from their villages? Also looking at how Bishnois relate to ecological sustainability and will try to identify the impact modernization has on them.

3. RESEARCH METHODOLOGY

3.1 Study approach

The epistemological approach to this thesis is aligned with critical theory which says that knowledge is subjective and constructed between individuals and groups (Brown and Dueñas, 2020). An interpretive qualitative research was carried on that assumes that social reality is not singular, nor it is objective, but it is rather shaped by human experiences and social contexts. It is therefore best studied in a social aspect while considering subjective interpretations of various participants (Pelz et al., 2020). Critical theory aims to understand organization in a community (Brown and Dueñas, 2020) and this is what I am looking in my study, as how Bishnoi as a community follow the principles and continue their livelihood whereas to see how cultural changes and adaptations takes place in it. Bishnois lifestyle which includes nature conservation and sustainable living are well documented but in the current time they might be at a risk of diminishing. As discussed earlier how different authors have placed Bishnois efforts into different categories as religious conservation, and community-based conservation, what I feel is that Bishnois efforts are aligned with TEK, also looking at the loss of their tradition from a lens of TEK can be beneficial as TEK is a thoroughly explored topic. Looking at Bishnois lifestyle from a lens of TEK could help us to dive deeper in their knowledge, like how the knowledge is transferred from one generation to the next and how the knowledge is threatened in today's world.

3.2 Selection of case study area

This study was supposed to be conducted in the state of Rajasthan specifically in western Rajasthan where majority of Bishnois live, as shown in *Fig.1* above. Unfortunately, due to the Covid-19 pandemic I was not able to travel to India, so I had to come with an alternate solution to gather data. I went online and saw what the possible ways are to reach out to the participants. As with the rise in technology many researches have moved online and carrying online research on the internet via computer mediated communication (CMC) (Garcia et al., 2009). This form of ethnographic research that I am carrying on is adapted to include the Internet's influence on contemporary social worlds, which is known as Netnography. It focuses on individual interactions resulting connections on internet or through computer-mediated communication. (Kozinets, 2010).

So, I reached online for help from a scholar in the field of social sciences who already worked on Bishnois, and she offered me to help as an external advisor for my study, from there I found contacts of Bishnoi people who were willing to get in touch and participate in my study. I snowballed samples from the handful of participants I had and managed to interview enough people until where I felt the incoming information got saturated and no new information was being retrieved.

Collecting data online in the form of interviews has its own challenges but on the other hand it is highly efficient, one does not need to travel to the field for work which saves a lot of time, money, and effort. For me it worked out well as I was able to interview Bishnoi people not only from Rajasthan but from the adjoining state of Haryana where they moved a couple of years ago due to severe droughts and rough environmental conditions (Reichert, 2015). Having a larger study group which is possible to do when one interviews people online hence the barrier of location is removed which ultimately helped me to study a more diverse group of people. It did benefit me ultimately to compare the knowledge of Bishnois living in towns/cities and Bishnois who still live in the villages. I

interviewed people of different age groups ranging from 22 years to 66 years old, to see if there are changes in their livelihood and philosophies across generations. Studying various age groups will also give an idea of how modern Bishnois think of their culture and principles when compared to the elder people in the community.

3.3 Data collection

Primary data was collected online, by the help of semi-structured interviews carried on for an ethnographic research. The target participants were Bishnois of various age groups, irrespective of gender, location, and occupation. I had no specific criteria for participant selection, but a diverse group is surely preferred than a homogenous group, to get an overall view of the tradition and culture across different age and location. I selected my participants from Rajasthan and Haryana as they are most commonly found in these regions, below in the annex 2 I have attached a map pinpointing the location of my research participants. A semi-structured interview was used for my research, as the interviews were conducted online and meeting more than once with a participant was not possible also due to a limited time frame, so a pre-prepared questionnaire was prepared. An interview guide with specific research questions was prepared (an example is shown below in *Table-4*) because an interviewee has a great deal of leeway in semi-structure interviews, about how to reply also the researcher has a freedom to include questions in the interview which were not there earlier but are picked up during interview on things said by the interviewee (Bryman 2004). The flexibility to adapt and add things in semi-structured interviews as in the case of Beardsworth and Keil (1992) during their research in food-related issues, during the progress of the study, the interviewees themselves raised additional issues which became an integral part of their study. This open-ended nature of the interview also permitted an iterative refinement for the study which was later presented to other interviewees helping in addition of information which would not have been possible otherwise. Online interviews come with its own problems and one of the main problems I faced was to get people who were willing to be participant in this study. I ended up contacting a total of 35 people at the end of my data collection, out of which I was able to interview 12 people. The number of interviews might seem low, but the information got saturated at one point and taking more interviews further had nothing much to add, so I stopped. Even though I managed to get the interviews done online, it was not an easy task. Getting an unknown person to talk to you online is a tough job and even if you manage to get that done, the interpretation of that data is not easy, to which Kozinets (2010, p.46) said that online interviews traditionally hinders lack of individual identifiers and body language, and such data can be difficult to interpret.

A qualitative research was most suitable for this ethnographic study because the information is regarding behaviour towards the nature, and in a field where one is trying to study the behavioural process they should focus on qualitative data (Bernard, 2017a). This approach towards the community will see their environmental knowledge relation to global sustainability movement and change in their behaviour and practices in current times. During online interviews a semi-structured interviewing method was used because this method can be used for data collection in situations where interviewer would not get more than one chance to interview a person (Bernard, 2017b).

Sub RQ	Key elements in RQ	Interview questions about key elements
How can the Bishnoi community and their present-day livelihoods be characterised in social sense?	Bishnoi community	Do you consider yourself as a Bishnoi? And is your community made of Bishnoi people mostly or are there other communities living together as well?
		What do you think about your (Bishnoi) community and the Bishnoi lifestyle? How is it different from other people and communities?
		How important are the principles for you to follow? Do you follow all the 29 principles given by Jamboji? If not, which ones are not followed, and why?

Table 3: An example of connecting research questions to interview questions (Find the full overview in Appendix 1)

3.4 Data analysis

The research involved qualitative data generated from semi-structured interviews conducted online with Bishnois of Rajasthan and Haryana. The data analysis was based on grounded theory which states that researcher can and should develop theory from rigorous analyses of empirical data (Charmaz and Belgrave, 2007). The primary qualitative data that I had in the form of interview transcriptions were interpreted and analysed by the help of atlas.ti software, this analytic process consisted of coding the data, developing, checking, and integrating theoretical categories and writing analytic narratives throughout inquiry. Which helped structuring the data and easy to understand and compare it to each other.

I interviewed 12 people and on an average each interview lasted for around 50 minutes. Later I transcribed the interviews and started to analyse them in atlas.ti software.

Steps taken for data analysis:

1. After transcribing the interviews, the transcriptions were analysed and coded on atlas.ti.
2. Specific codes were assigned to similar answers across different interview transcriptions.

3. A total of 83 codes were assigned which were further grouped into 10 code groups for easy identification.
4. After identification of codes, the research questions were broken down into small sub-groups and then the codes resonating with the sub-groups were put together into a same network.
5. The network feature of atlas.ti was used for visualizing the output, while showing the frequency of the codes occurring throughout the data which makes it easier to see codes with maximum occurrence thus implies that the specific code has the most impact on the subject one has been looking at. An example from the analysis is given below in *figure- 5*.
6. Various other network groups similarly were developed for visualisation of data.
7. Some previously done literature on Bishnois were also added to the analysis to see if my findings were resonating to some other research previously done.
8. At the end, the most frequently occurring codes were grouped together into separate code groups in regards with their topic of analysis, as these were the reasons affecting the research topic.
9. Finally, the results were written down.

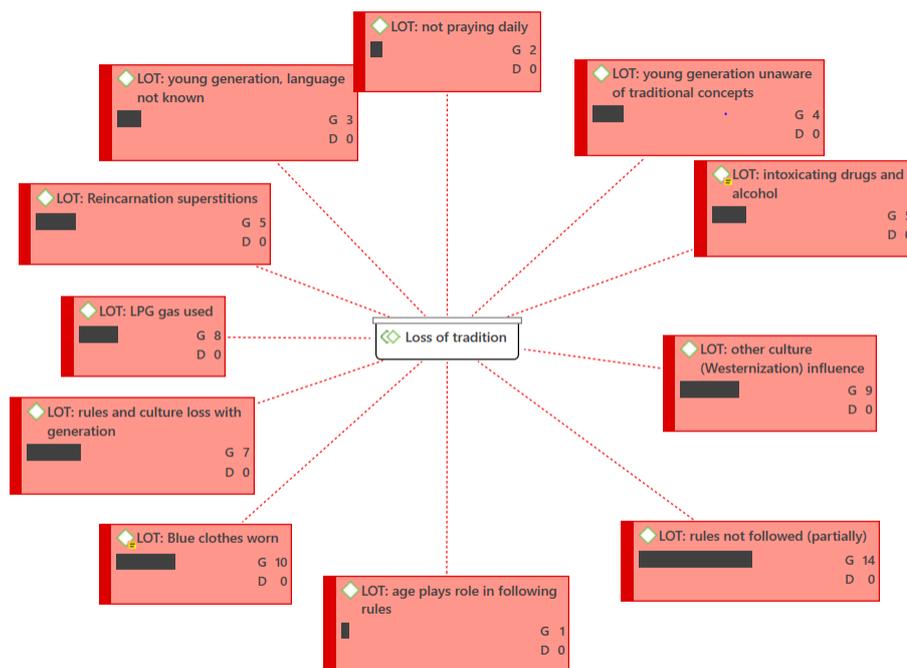


Figure 6: Factors affecting loss of tradition (LOT), along with the frequency of occurrence in the data.

4. RESULTS

4.1 Cultural changes and adaptations in Bishnois lifestyle

Growing interaction of Indigenous communities/traditional people with the rest of the world is an increasing threat to these groups, since they are left out of the processes of economic development. This can lead many indigenous groups to become marginalized and lead to the disappearance of their traditional practices (WCED, 1987).

The world's cultural diversity is on a decline and scientists agree that there are many potential drivers responsible for cultural change and that varies across cultures and time period (Reyes-García et al., 2013). While the whole world is facing this problem India is no different to it and similarly for Bishnois. Reichert (2015) found that rural India is changing drastically. The lifestyle and philosophy of young Bishnois is completely different than from their elders. The influence of western media and consumerism has changed Bishnoi way of life drastically. We know that traditional knowledge is threatened globally but the local and indigenous knowledge is being transformed globally and mainly the knowledge pertaining to ecology is being eroded (Aswani et al., 2018). Bishnois livelihood in present times is threatened and there are various factors responsible to it which are discussed further discussed in this chapter. Firstly, the changes in this community will be discussed and later the retaining livelihood aspects as well to see a wholistic status of the Bishnoi community.

Classification of threats to Bishnoi TK

Since the early 1970s, research on the causes leading to loss of TEK has got an increase attention from academia (Tang, 2012). Not so much is written on Bishnois TEK though but the TK of Bishnois is constantly changing as well, I have here tried to explain by categorizing the threats in table below which is inspired by Tang and Gavin (2016) but adjusted according to my research findings. These threats are further broken down to sub-categories with their explanations and further detailed about the sub-categories individually.

S.no	Categories of threat	Sub-categories	Explanation (in reference to Bishnois)
1.	Change of traditional livelihood practices	a) Moving away from villages (Urbanization)	Following with the rest of the world, Bishnois also move to cities in search of good education and better job opportunities.
		b) Reduced land-based activities	As people move to cities for various purposes, they leave their land to someone to cultivate and thus not engage themselves into land-based activities anymore.
		c) Influence induced by dominant societies and reduced incentives and interests in TEK	Influenced from western dresses leads to the loss of one's own traditional clothing. Also, owning a smartphone, computer, car etc.

		d) Reliance on modern products and/or techniques	Using modern form of cleaning products and modern LPG stoves/electric stoves for cooking leads to the loss of traditional methods of cleaning and cooking.
2.	Loss of pathways of TEK transmission	a) Loss of traditional language	Taken over by another dominant language. Elders passing away without transmitting the indigenous language to younger generations.
		b) Younger generation's absence from the traditional community	Younger generations move to cities/towns for education or job, disconnecting them from their own community.
		c) Influence induced by formal education system	Modern education has changed the way of thinking for Bishnois leading to miss out their traditional form of knowledge
3.	Change of traditional religion and beliefs	a) Influence of other cultures and lifestyles	Influence from other dominant cultures leading to the loss of one's own culture and traditions.
		b) Loss of traditional beliefs	Younger generations do not believe anymore in their religious traditions.

1. Change of traditional livelihood practices:

One of the main reasons for the change in traditional livelihood is the reduced reliance on traditional livelihood practices. Reliance on external products and technologies changes peoples traditional lifestyle (Tang and Gavin, 2016). This reliance on external products and their availability comes from modernization. According to Inglehart and Welzel (2007) modernization impacts all aspects of life but mainly the technological and economical part. None of my participants were directly linked to agriculture. The older participants were mentioned that in recent years young generation has been moving outside village for different jobs and leaving agriculture behind. Which leads to their lifestyle being affected from external factors and this influence leads to the change in their traditional lifestyle. Some important factors affecting the change in livelihood of Bishnois are described below:

a) Moving away from villages (Urbanization): I found out amongst my respondents one of the main reasons for the loss of traditional livelihood is their moving away from the villages to cities for finding jobs or for education. 100% of my respondents moved away from their village at some instance in their lifetime either for education or for their jobs and most of them are still living in cities or are permanently settled in the cities. As cities offer a convenient lifestyle over a village life and one of my respondents said that the new generation is no more interested in doing agriculture and are finding more convenient jobs in the cities. The rate of urbanization is rising tremendously in India and in Rajasthan, Khanna (2019) found out that the time period between 1981 and 2011 is the period of rapid urbanization in Rajasthan. A graph below by Khanna shows us the urban population of Rajasthan in percentage against decadal time change from 1901 to 2011. Rajasthan has a population of 68.54 million in the year 2011 according to

State census (2021) of India and there are less than 1 million Bishnois in India and most of them lives in Rajasthan (Reichert, 2015) so the growth in urbanization of Rajasthan means urbanization of Bishnoi villages and Bishnoi people as well.

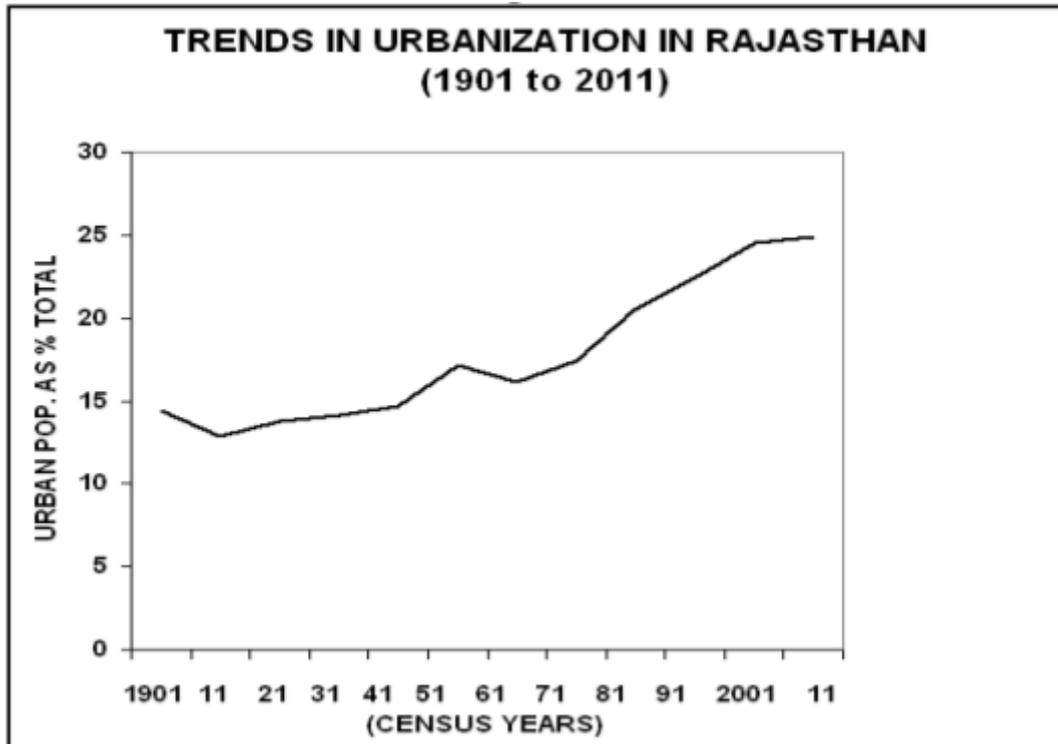


Figure 7: Growth of urban population in Rajasthan (1901-2011)

- b) Reduced land-based activities:** Bishnois are primarily an agrarian community, but times have changed. People are moving out of their villages to find other jobs and fewer and fewer people are engaged with agriculture anymore. One of my respondents told me that once people get educated, they do not want to participate in agriculture anymore, he added that they think agriculture is not a job for educated people. This detachment from the land can lead to reduced reliance on traditional livelihood and therefore loss in ones TK. Getting detached from agriculture further leads to not being able to take care of animals by providing food and water and taking care of them.
- c) Influence induced by dominant societies:** From being influenced by western dresses leaving the traditional clothing behind to being influenced by famous Bollywood/Punjabi music over traditional music during ceremonies, there has been a lot of changes in Bishnoi society by external sources. In my study found out that Bishnois used to avoid blue colour clothes as the colour used to come from indigo plant which makes the land barren after its harvest, but young Bishnois nowadays wear blue clothes without any restrictions. One of my respondents told me that even if they want to avoid it, they cannot do sometimes and said in school we must wear a blue colour uniform and I cannot avoid that if I have to get an education there. More than half of respondents lived in a mix community which in turn also influence the lived tradition. One of my

respondents told me that they do not have rainwater harvesting tanks because they live in a residential apartment with other communities, and we cannot make one here.

- d) Reliance on modern products and/or techniques:** My respondents told me that firstly the people are moving out of villages for various purposes but secondly the villages themselves are being urbanized. Earlier no one bought groceries from market now everyone does as it is convenient and have various options to choose from. Bishnois used to collect fallen twigs and branches and used to dry cow dung as fuelwood to cook on brick stove, but the availability of LPG cylinders has excluded this traditional way of cooking. Bishnois also used to wash their utensils with ash left over from the fuelwood they used to cook. On being asked to my respondent he replied that we need to have ash first to wash the dishes with that. LPG cylinders have been made available to every household hence other method of cooking is not used often. Not only that but the market integration and easy availability of modern soaps and detergents have made the traditional ways of cleaning themselves with diluted buttermilk and washing clothes with a fruit found from the soap nut tree has vanished. While there are many factors discussed about the livelihood loss of Bishnois, one thing that I haven't include in it, but is made clear by Reichert (2015) that the underlying reason of the rapid environmental changes in the region have also an influence on Bishnois way of life.

2. Loss of pathways of TEK transmission

Transmission of knowledge is an important aspect of social sciences but transmission of traditional ecological knowledge amongst generations remains a neglected field (Berkes, 1993). Transmission of knowledge from one generation to next is important to carry on the traditions. Important thing is it to be done in the traditional language as in the case of Bishnois their 29 rules their 120 *shabd*s these are written in their traditional Bagri dialect; these are sung during prayers as well and one must need to know the language to understand the meaning of it.

- a) Loss of traditional language:** TEK is often conveyed by languages and the loss of language diversity directly affect the loss of knowledge diversity (Mafi, 2001). Language loss does impact the TEK transmission but only 25% of my respondents did not know their local language but as most of them are living in cities/towns they do not use the traditional language so often therefore it might be a factor of TEK transmission loss. The boom in literacy in past few years in India comes with a consequent loss of oral culture, Reichert (2015) made a striking observation about how Bishnoi women have songs for everything and they sing these traditional songs as they go by doing their daily tasks, but she noticed that none of the younger girls ever sang. On being asked by one of the younger women replied, "We don't even know the language that our parents and grandparents sing in". Reichert says that the new generation of school going girls learn Hindi and English but no longer the Rajasthani dialect of their parents. She adds up that within few decades, these beautiful and ancient songs will be lost to modernity. During my interviews I found out that Bishnois know their local dialect especially older generation, but the dialect is not frequently used. As many people are living away from villages so they either talk in English or Hindi, they only use traditional dialect either when they are at their village or with their family members. One of my informants who works as an engineer in Jodhpur (a city in

Rajasthan) told me that “we speak in the local dialect when we are at village with everyone but I have a son who is 5 years old and he has been brought up in the city and only speaks Hindi and when we take him to the village, people are awestruck when they listen to my son talking in Hindi and say that why he doesn’t speak in Marwari (the local dialect)”. Whereas most of my informants said they speak in local dialect except from some young Bishnois who have completely forgotten the dialect. So, the older generation seems to have a hold of it whereas the young generation seem to lose the traditional language, which could also be the case of modern education and moving away from village into cities where languages like Hindi and English are used more commonly to interact with other people.

b) Younger generation’s absence from the traditional community: younger generations move to cities/towns for better job and education purposes which can disconnect them from their tradition. 60% of my respondents were young people below the age of 30 and each one of them were living away from their village mostly for their education and some for their jobs. These young people far from their village are disconnected to their tradition for years and it can be seen by their lifestyle which is different than a Bishnoi living in a village. The disconnectedness to the traditional lifestyle is explained in points below:

- i) Young Bishnois not engaged with agriculture.
- ii) Young Bishnois no engagement in Orans maintenance.
- iii) Young generation not wearing traditional clothes.
- iv) Not following traditional dances and songs, influenced by other cultures traditions.
- v) They are unaware of certain traditional concepts.

One of respondents who is a final year engineering student in Haryana told me that “My parents and grandparents they follow all the rules and regulations at least most of them, whereas I have been living in a hostel in my university campus away from home and it is not only hard but sometimes impossible to follow some of the rules”. Another young respondent from Haryana who is a 22-year-old law student told me that “obviously there are difference in terms of following the principles between our elders and us because of all the changes around us, but changes are inevitable and with time everything will change.” These changes in lifestyle in young generation is there as they are moving to cities for jobs and education and as the young generation is moving away from village, the tradition, the knowledge of the community is threatened.

c) Influence induced by formal education system: The formal education system also had a role to play, most of my respondents received modern education and they agreed that it affects the traditional way of life. All my respondents said that modern education is important in order to move with time and society as a whole. But they believed that modern education system has a lack of moral values and social skills. People agreed that modern education is important to receive but not at the cost of losing traditional knowledge and values. If we look at the of literacy in Rajasthan in between years 1991 and 2011 literacy rate soared from 35.55% to 67.06% (Census of India, 2011) and increasing since then. This in turn can have an impact on the loss of TEK transmission indirectly.

3. Change of traditional religion and beliefs:

Beliefs and worldviews serve as the fundamental elements shaping all aspects of TEK (Berkes, 2012). Bishnois is a community who take their 29 principles to be followed very seriously. Their religious beliefs are exceptional, one of the principles being to remain pure vegetarian is followed strictly in this community. One of my respondents told me that Bishnois would not even buy groceries from a shop if they sell meat products or even eggs. But there are differences amongst Bishnois in terms of the principles that they follow. Whereas on being asked that if there is a difference in the degree of strictness to follow these 29 rules, almost all my participants said that they all are equally important. But on being more specific on independent rules I found that there is a difference, and some rules are more strictly followed than some others.

- a) **Influence of other cultures and lifestyles:** Bishnois have spread across the western India as I told earlier most of them living in the state of Rajasthan. As there has been better connectivity of roads everywhere and people commute easily from one place to another. Hence different communities and culture interact more and people from different places share and connect with other communities which influences other cultures and lifestyles. Similarly, we are living in the age of internet where everyone has access to internet making it easy to access anything on the internet and getting influenced from it. One of my respondents told me that they prefer Punjabi music over traditional music and even in their festivals and ceremonies they prefer to have Hindi and Punjabi music. One of my older respondents explained his grief by saying that modern education is important but for our community it is proving to have negative impacts.
- b) **Loss of traditional beliefs:** As I already said Bishnois strongly believe in their dharma. The younger educated Bishnois even talk about their religion from scientific point of view and say that Jamboji looked way ahead of his time and the rules he made 500 years ago and proven today by science that are helpful for a better balance between human and nature. Older Bishnoi people still would not wear blue clothes as it is one of the 29 principles whereas a young educated Bishnoi says that it was a good rule until blue colour was extracted from the indigo plant and now it is not used anymore, and no plants are being harvested for that we can wear blue clothes. Some other traditional rules that are not being followed are cooking one's own food, taking shower regularly, observing fast etc. There is a loss of traditional beliefs, and it is directly related to the generation gap.

Bishnoi community is not an average community, I believe they are a link between old traditional indigenous people and modern conservation society. They lived in a phase of droughts and tough conditions which made them take steps to survive in the arid region. They knew well before anyone else that for survival of humans, nature is not to be exploited but to be taken care of and to be respected.

We just saw above the loss of traditional lifestyle in the Bishnoi community, but there are still some livelihood aspects which are well retained by Bishnois even today indicating that there is a hope/chance of its survival. I have categorized them into principles retention and livelihood retention. Out of the 29 rules what I found in my study is that the 8 rules dedicated to environment are strictly followed by Bishnois, below I have shared the environment rules that are still practiced.

- 1. Finding an alternate source of fuel wood:** Since most of my respondents live in the city/town and has access to LPG gas stove, they do not use fuelwood anymore, but they do visit their village from time to time and there they use either dead twigs and branches or dried cow dung. But as the Bishnois or I must say the modern Bishnois who have moved to cities have adapted to modern lifestyle. They have been using modern technology and does not seem to bother as much about these adaptations.
- 2. Trees planted and taken care of:** Bishnois have a close relation to trees, especially the *Khejri* tree which is of great religious significance to them. They plant trees whenever they get the opportunity to and mostly, they do it during festivals almost every year.
- 3. Animals are protected and provided shelter:** The recognition Bishnois get in India or around the globe is due to their stringent conservation practices of the wild animals they have in their region. Most of my respondents are city dwelled and had not much interaction with the wildlife, but Bishnois help all the animals and even the stray animals are taken care of and provided food whenever the opportunity appears, but one respondent was an active participant of wildlife protection in his region, who made significant contribution in animal protection.
- 4. Compassion towards plant and animals:** Bishnois are more compassionate towards other living organism than other humans. They believe them to be as their own and an equal importance is given to an animal's life as of humans. A picture below shows how a Bishnoi women is feeding an orphan blackbuck fawn from her own breasts.

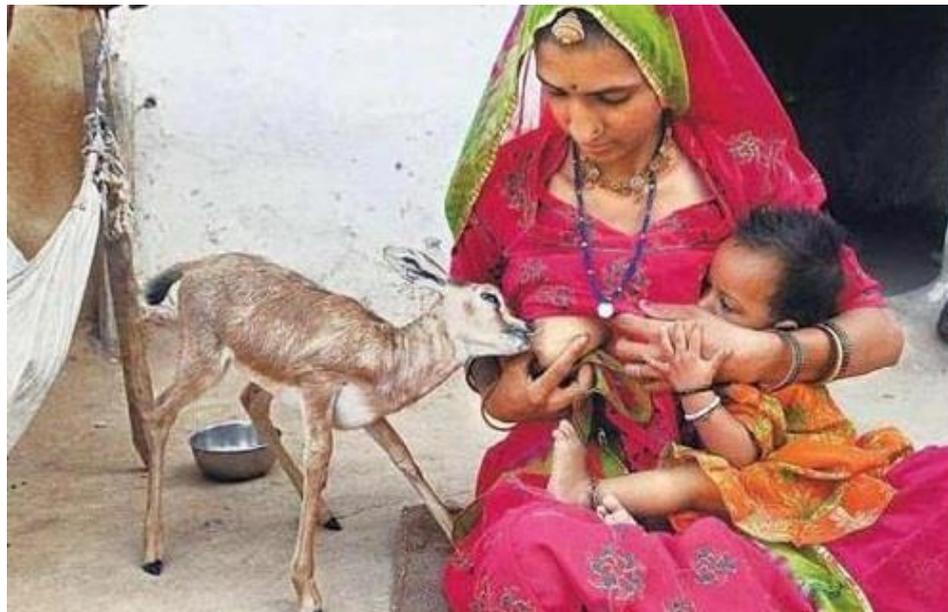


Figure 8: A Bishnoi women feeding an orphan blackbuck fawn (Humairah,, 2017)

- 5. Remaining pure vegetarian:** Bishnois remain pure vegetarian, none of my participants ever disobeyed this rule. One of my participants said that in case someone disobeys this rule and are

caught they were to be paid fine to the community. But almost all my respondents never even came across a Bishnoi who eats meat or even egg. Their diet mostly includes of grains, rice, wheat, millet, and milk derived products.

Livelihood retention:

- 1. Burying the dead ones:** Bishnois still bury their dead ones, even though researchers like (P. Jain, 2011) say that Bishnois are closely related to Hindus and also my informants agreed themselves on being related to Hindus, but this rule is opposite to Hindu cremation of the dead ones. On being asked to my respondents why they bury the dead ones instead of cremating. They said because burning needs a lot of firewood and we do not cut green trees, so we bury them instead.
- 2. People engaged into agriculture:** Even though Bishnois are Urbanizing but some of them are still related to agriculture. Some of my respondents even want to go back to the village and continue doing agriculture after working in the city for a while.
- 3. Rainwater harvesting:** Western Rajasthan has a shortage of water and Bishnois harvest the rainwater by constructing a tank in the front yard collecting the rainwater in the monsoons from the terrace leading to the tank. The water is mostly used for only drinking purposes and can last from 6-8 months. Most of the Bishnois living in Rajasthan still do it but Bishnois moved to Haryana do not follow it anymore. 60% of my respondents were from Rajasthan and 40% of them from Haryana, all the people from Rajasthan had a rainwater harvesting tank but none had it from Haryana. They all had the same reason for not building one in Haryana as they do not have acute shortage of water in Haryana as it happens in Rajasthan, they have a perennial source of water hence they do not need to harvest rainwater.
- 4. Donations are made:** As Bishnois are compassionate people and they have learnt for hundreds of years to be compassionate to humans and other living organism. Bishnois donate a certain amount of money from their earnings for a good cause. Mostly the donations are in the form of grains and food for the animals in rescue centres or money is provided to either these animal shelters or to any other organization or cause in need of money. The amount for donation depends on the earnings but at least 10% of the total earnings are donated.

4.2 Bishnois Livelihood practices and its relation to TEK

As most of the Bishnoi livelihood and practices are already discussed above, this chapter will be more of how their lifestyle can be related to TEK. Bishnois are mainly an agrarian community and live in the villages, but recently young Bishnois have been moving to bigger cities to get better education, have better job prospects and to earn more money. But Bishnois living in villages are farmers and agriculturists, they are a well-off community and are considered high cast due to their strict purity rules as also mentioned in the 29 rules (Reichert, 2015). The Bishnois are known for their strict 29 principles that they follow, all the 29 rules do not have an equal status but in my research, I

found that people on being asked to say that all the rules are equally important but on being asked which rules you follow every day and which rule might not be possible to follow, so there seems to be a difference in strictness for the rules being followed. For example, not eating meat and remaining strictly vegetarian is strictly followed by them, whereas cooking your own food daily is not followed strictly.

Bishnoi lifestyle and its similarities to TEK

Here I will breakdown TEK as explained by Berkes (1993) and compare it to the Bishnoi lifestyle to see if the similarities their lifestyle shows to TEK. As we know TEK is a cumulative body of knowledge and beliefs which is handed down through generations by cultural transmission. The Bishnois for the past 500 years have been following the 29 principles Jambeshwarji has given to them, these rules are a cumulative body of knowledge that has helped them to thrive in the arid region of Rajasthan. These rules are followed strictly by Bishnois and even today people follow them daily, which proves the successful passing on of the knowledge to the further generations. Though there have been some changes in recent years to their knowledge, but more will be discussed about it in the next chapter. In my research that I carried out I found that the knowledge is passed on to further generation successfully by performing numerous activities inclusive of young generations for both the religious aspects as well as the ecological aspect of it. The knowledge of protecting trees, animals and sustainable resource use is transmitted culturally, the Bishnois not only have the 29 rules explaining their principles but 120 *shabd*s or statements in which Jambeshwarji's teachings are preserved and they are sung during prayers. The cultural activities of Bishnois include *havan* (fire ceremony) in which they recite the 120 *shabd*s which includes the ecological aspect of protecting animals and trees and taking care of the environment. These 120 *shabd*s are also recited when a baby is born and usually during the morning hours on certain traditional ceremonies. Apart from the 29 rules where he explains why environment protection is important, he does so in an elaborate manner in these *shabd*s not only that Jameswarji also criticized both Hindu and Muslim people in these *shabd*s about their corrupt practices, he warned people in his second *shabda* about harming the animals. Also, he inspired people in his *shabd*s to plant trees (P. Jain, 2011).

The cultural transmission of knowledge through generations is about the relationship of living beings (including humans) with one another and with their environment. The incident of Khejrli in 1700's as discussed above, where hundreds of Bishnois were massacred because they were protecting trees. This example can give one an idea about the relation Bishnoi community has with the nature and the environment around them. Many incidents have been since then, where Bishnoi are fierce in protecting their local environment. Recently Bishnois have led a movement against construction of a nuclear power plant in a site in Haryana which is a critical natural habitat for blackbucks. They are demanding an adequate conservation plan for the wildlife in that region (Mukherjee, 2019). The Bishnoi community is also becoming powerful since they are being noticed for their efforts but above all, they are persistent with their efforts in nature conservation. They managed to make the famous Bollywood star Salman Khan guilty for poaching blackbuck in a village near Jodhpur. The conviction of the famous actor would not have been possible without the sustained pressure by the Bishnois. They have been really dedicated to their beliefs and the way they sustained pressure on the authorities in Jodhpur against Salman Khan shows that a community so immersed in its cultural

values of conservation can be very effective in nature conservation (Shekhawat, 2018). Bishnois efforts in taking care of the non-human organisms around them are well known but in the same way they do care for their human counterparts when they find someone in need. Like one of my respondents told me that they usually prepare extra food to give it either to animals or in case they see any poor person, they provide them with food.

Further TEK is an attribute of societies with historical continuity in resource use practices and mostly these societies are less technologically advanced. Bishnois using cow dung as an alternative for firewood for cooking purposes for hundreds of years can explain their resource use practice. What makes the efforts of Bishnois unique is that they understood the concept of sustainable use well before the rest of the world. The arid conditions and shortage of resources made them realize that in order to survive we need to protect these resources and use the available resources carefully. With Bishnois following the rules given by their Guru over the years they made living in these tough conditions possible. Not only that but Bishnoi villages are ecologically and economically successful than other people in adjoining villages (Hall, 2011).

Bishnois closing the gap between TEK and modern sustainability:

Bishnois environment rules are told to be ahead of their time, one of my respondents who works in a bank in Haryana told me that 'Jambeshwarji's thinking was way ahead of his time, and he is also considered to be one of the oldest scientists'. His rules made people use their scarce resources sustainably which tells us that their livelihood has a hint of modern conservation. Their livelihood includes using only fallen branches and twigs as a fuel source and they avoid cutting green trees and they plant lots of trees. That is like the modern concept of afforestation and avoiding deforestation. Bishnois also made Orans (sacred groves), that recharges ground water, which can later be used as a water source for themselves, wild animals, and domestic animals. Where rainwater harvesting might sound like a relatively new concept, but Bishnois have been doing it for hundreds of years. They make a rainwater harvesting tank in their front yard and just before rain they clean their terrace and collect all the rainwater in the tank and use it for drinking purpose mainly.

Living in a desert area have taught Bishnois a lot about survival, the main lessons they learnt from living in this region is that conserving the limited resources one has and respecting other creatures and their life, can lead to a self-sustainable livelihood.

4.3 Bishnois philosophy as an ecologically sustainable community

Many anthropological studies have been conducted on the relationship of man and its relationship with the environment since the 19th century (Moran, 2008). Here we talk about the relation between Bishnois and their environment and how their livelihood is sustainable. Ecosystems are known to contribute for the fulfilment of human requirement; it provides most of the goods for humans to survive and maintain the economy, like food, timber, fuel etc (Daily, 1997). Ecosystems are also known to provide indirect benefits for humans like nutrient cycling, maintenance of biodiversity, mitigation of droughts and floods not only that but some intangible benefits are also retrieved from

the ecosystem like spiritual and recreational stimulation (Postel and Carpenter, 1997). Even though these direct benefits retrieved from the ecosystem are well known by the general public but they are deplorably underappreciated (Daily, 1997). Due to the under recognition of the benefits that we receive from these natural resources, the way we manage them leads to ecosystem degradation which leads to the concerns that human enterprise may jeopardize the viability of ecosystems (Vitousek et.al, 1997). Due to the threat caused by humans on ecosystems a shift in paradigm of management is now focussing on long term management and sustainability of ecosystems so that future generations can derive the same ecosystem services that current generation enjoys (Johnson et al., 1993). Where the concept sustainability became popular in public after the report of the world commission on environment and development of United Nations in 1987, known as the Brundtland Commission, only then people started to realize the importance of the ecosystems health whereas some tribal communities like Bishnois of Rajasthan have been eco-friendly for centuries (Bikku, 2019). The ill impact of humans on ecosystems are well known by general public and for that governing bodies are made for its regulation in order to cope up with development challenges and making policies to prevent environmental degradation (WCED, 1987). To which Bikku (2019, p.47) stated “in any group or community or society, the conservation practice could only be sustained once strict rules and limitations are followed by the people,” and this is not happening only in modern times, but rules for conservation and sustainability have been made in communities and societies before and these kind of rules are made and modified through generations on the foundation of the ecological conditions of the area, natural resource availability and the population. The restrictions and strict rules over a period results as beliefs and ethics, which plays a significant part in the ecological sustainability in the given environment. The ethics and thoughts are generally connected to the spiritual beliefs, where the principles must be obeyed by the community individuals, which reflect their day-to-day activities.

Tribes and forest dependent communities in India have been following totems and ethical values through generations which lead them to use the natural resources sustainably also protecting certain plants and animal species in their locality. These specific areas (piece of land), called sacred groves in India and Orans (sacred groves) in the case of Bishnois are restricted for poaching wild animals or felling of the trees (Bikku, 2019). There are various tribes known for the sustainable use of their resources but Jain (2011) says for the Indian traditional communities, environmentalism is ingrained in their daily life and it is a part of their religion.

In the 16th century, according to traditional stories and scriptures from medieval time the western region of Rajasthan had frequent droughts and scarcity of food and water which led to a huge impact on the survival of human beings and others species in the Thar desert (Bikku, 2019). Jambeshwarji was 25 years old when this happened, apart from shortage of food and water, people in the region cut down large number of trees to sell the wood in adjoining towns. Wild deer species in the region were widely hunted for meat consumption, and many people left the region for more lush green lands. Jambeshwarji felt threatened for his society and began his quest to find a solution. After couple of years meditation at the of 34 he had a vision of humans destroying the nature around them which sustained them. He then decided to rectify the society by concluding that humans need to take care of the nature in order for the nature to take care of them (P. Jain, 2011). Jambeshwarji’s teachings of natural resource management during the severe droughts in western Rajasthan succeeded in conserving and protecting many local resources and he managed to make people stay in the region on one cost, that the 29 rules he made for better living and taking care of

the environment needed to be followed and one would thrive in this region. To which Bishnoi and Bishnoi (2002) say that “The Bishnoi’s religion was born out of environmental necessity and convictions”. The Bishnois themselves believe that those who follow the 29 principles can manage natural resources in a sustainable manner and could find less problems in life (Bikku, 2019). Jain (2011), specifically mentioned for Bishnois, that they go beyond the boundaries of Hinduism and Islam because they not only follow rituals and scriptures but are concerned about their natural resources and how to sustainably use them, this sets them aside from other religions, and not to forget their dedication to protect their biodiversity even at the cost of their own life. This dedication with for nature conservation and compassion towards all living beings is the key reason why in Bishnoi villages there are more number of wild animals (black buck) than compared to non Bishnoi villages (Hall and Chhangani, 2015).

But how does this look today? Are all Bishnois willing to sacrifice their life to protect an animal or a tree? As also discussed in the chapter above, explaining how Bishnoi people are moving away from villages, and this might impact their practice of the 29 rules.

The Bishnois who participated in my study, I found out that even though most of them moved out of their villages for various purposes, they remain connected to their ethos. Upon asking my interviewees that ‘do you feel any change in your lifestyle when you moved to the city?’ To which most of them replied that somethings have changed for sure, but we do or best and try to follow as many rules as we can out of the 29 principles.’ Which got me thinking that, if a Bishnoi moves to a city, will they be able to provide food and help an animal the same way they do in their villages? When asked this to my interviewees, one of my respondents (who was student of civil services from Haryana) said that ‘there needs to be an animal first whom you can feed and, in the cities, it is hard to find one’.

The eight rules of nature conservation given above in Table-1 will be explained here in detail and how traditional Bishnois follow them comparing how modern Bishnois (People living away from villages) follow them.

S.no	Environment rules followed traditionally	Environment rules followed by modern Bishnois
1.	The first rule being filtering water, milk, and firewood (to prevent killing and burning insects), Traditional Bishnois follow this strictly even today. They filter water, milk and they shake firewood or dried cow dung before burning them, because it contains small insects. For Bishnois, these organisms have an equal importance to live as humans and they follow it strictly.	Modern Bishnois follow this rule. They filter water and milk before drinking. As they live in cities and have easy excess to LPG gas cylinder, so they do not use wood/cow dung anymore.
2.	The second rule being to have pity on living beings and love them. Bishnois are extremely generous people, they take care of their pet animals and the wild animals in their region as their own family member. They mourn on the death of a wild animal as they would for any	Modern Bishnois have the same ethics as the traditional Bishnois, they are equally generous and have the same feelings for animals. The difference occurs in terms of practicing this. As for Bishnois living in the city, they do not come across wild animals,

	<p>of their own human counterpart. Bishnois have animal shelters attached to temples in most of their villages, where they bring injured animals and treat them until they recover to go back in the wild. Not only they are generous for animals, but they are very furious people as well if someone attacks these animals. Bishnois are known for their extreme steps to save wild animals from the poachers, so much so that one can give their life to save an animal. A study conducted by Hall (2011) on Blackbuck antelope, found that there are significantly more blackbucks in villages with Bishnoi population than with villages without Bishnoi people.</p>	<p>whom they can help or feed. Even though they hold same values, but they cannot practice protecting wild animals or providing them food actively.</p>
3.	<p>The third rule of being compassionate is engraved into Bishnoi people, it is a religious duty for them to be compassionate towards living organisms and to provide water, grains and fodder to wild animals and birds. It is said that those who feed and protect non-human animals and trees they are true Bishnois, and they are living according to their dharma (Reichert, 2015). the first thing a Bishnoi does when he/she wakes up in the morning is to provide food and water to birds or animals.</p>	<p>Modern Bishnois are equally compassionate to the traditional counterparts. But modern Bishnois are living away from villages and are busy with their work/education life, they do not spend so much time with animals, but they provide birds daily with food grains and water and in some cases also to insects. Absence of wild animals in cities also disconnects modern Bishnois from their practices.</p>
4.	<p>Fourth rule being not to cut green trees and save environment. The incident of 363 Bishnois giving their life away for trees that I have discussed above is an example of how seriously Bishnois take this rule. But according to the study done by Reichert (2015) Bishnoi take the commandment of not cutting trees seriously although there seems to be some flexibility in the community, where some say not a single branch can be cut other allowing for pruning. The Khejri (<i>Prosopis cineraria</i>) tree which is a native tree species of the Northwest India, is known to be of significant importance to the Bishnois and a study done by Hall (2011), proved that on comparison between the number of Khejri trees in Bishnoi and non-Bishnoi villages, Bishnoi villages have a higher average number of Khejri trees.</p>	<p>Modern Bishnoi tell the story of Khejri very proudly and even today they hold the same values and consider cutting trees a bad deed. But upon asking one of my respondents who is a law student, that what if you are using wood that you yourself are not cutting but are using indirectly for example in house construction? To which she answered, 'we are guilty about that, but somethings are unavoidable'. Even though they practice these thins seriously but in modern times of mass consumerism somethings are indeed unavoidable.</p>
5.	<p>Providing shelter to animals is the fifth rule in which almost every Bishnoi village has a shelter for treating wild animals injured or abandoned are taken care of. The shelters are</p>	<p>Modern Bishnois living in the city are not able to take part in this, but they regularly donate money to temples and animals shelters to continue with their good work</p>

	usually adjoined with a Bishnoi temples in major Bishnoi temples and in other cases they are by themselves. These shelters are well funded by the money donated by Bishnois and is a collaborative community effort. Reichert (2015), during her fieldwork found that most, animals in these shelters have enough space, with animals receiving regular food, water, and medical care. Also, most of the workers in the temples are young boys and they take pride in their work.	uninterrupted. They might be away from villages but their believes have not changed and they do whatever they can to help animals but also, they donate money to any other good cause (for example donating to farmers protests in India or covid relief fund etc.). One of my interviewee who regularly visits his village and is actively involved with wildlife protection and animal shelter management in his village (<i>Figure- </i>).
6.	In rule six, Bishnois do not sterilize ox, they believe one have the right to live a natural life and humans do not have a right to take it away from any other organism. Not much is said about this rule as it is straightforward and Bishnois avoid doing this.	Modern Bishnois do not directly engage with this but most of my respondents visit their village often and their elders still avoid doing this.
7.	Seventh rule being not to eat meat and remaining pure vegetarian is strictly followed by Bishnois. They are compassionate people, not only to their own kind but to other organisms as well, so much so that do not eat any kind of meat and even filter out the smallest kind of insect carefully before drinking water/milk.	Of all the respondents I had in my study all of them were strict vegetarians and adhere this rule no matter what. One of my respondents who works at a Bank in Haryana told me that “we would not even buy groceries from place where they sell meat or even eggs”. People did share that there are few cases in which Bishnois do eat meat, but if caught they are dealt by the villagers themselves in the form of fine. But none of my respondents ever witnessed it themselves. Not only they not eat meat or eggs they also try to spread this idea to others. Two of my respondents who are university students said that they share these ideas with friends and also during debates in university.
8.	The eighth rule related to nature conservation according to Bishnois are to avoid wearing blue clothes. According to Reichert (2015), she says that there is a prohibition against wearing blue clothes but many Bishnois especially young people and people living in cities wear blue clothes..	I found similar results from my participants, people below the age of 30 tend to wear blue clothes whereas old people still strictly avoid wearing blue clothes. Upon asking the reason why they wear blue clothes now, I got a common answer saying earlier blue colour extracted synthetically so it does not really matter now if we wear blue or not. This tells us that the young generation of educated Bishnois talk about their teachings and practices differently than older uneducated Bishnois.



Figure 9: A Bishnoi man feeding a rescued Chinkara at Dhuru village Rajasthan, photo by Mahendar Singh Bishnoi

Apart from these dedicated rules for environment protection there are few other sustainable tasks and conservation activities Bishnois do, they are the followings:

Orans: haven for wildlife

Orans are sanctuaries made by Bishnoi people for plant and animals, which are also known as sacred groves. Despite the challenging climate and arid desert conditions these areas support a higher density of both human and wild animal populations than any other desert region in the world (Gaur and Gaur, 2004). A study conducted by Hall and Chhangani (2015), they observed three times more blackbucks (*Antelope cervicapra*) in Bishnoi villages compared to villages without Bishnois. This highly significant result shows that Bishnois villages provide a protective habitat for the desert wildlife. Not only that but these orans are a haven for trees like Khejari, Kumta, Rohida and other desert bushes along with animals like blackbuck, gazelle, fox, and cat with birds like the kestrel, vulture, peafowl,

wagtail tailor bird etc. These orans also consist of a pond that acts as a natural reservoir of rainwater and is used by villagers for drinking water and sometimes these orans can also be used as a grazing ground for village livestock.

Orans are still maintained in the Bishnoi villages, but modern Bishnois who live in cities or away from villages do not participate in its maintenance. My respondent an engineer who works in Jodhpur told me that 'in past couple of years the orans have been deformed due to encroachment, people have slowly and slowly started to add Oran's land into their farms, which leads to the water catchment is completely disturbed and it does not have enough water for animals.'



Figure 10: Blackbuck (Antelope cervicapra), photo by Alexis Reichert (2015)

Alternative fuel source

Even today one-third of the world's population is using solid fuels for cooking and heating (Gould and Urpelainen, 2018). Using solid fuels could cause diseases but they have harmful environment effects as well like acceleration in degradation of forests and climate consequences as well. Data analysed by Bahre and Hutchinson (1985) of vegetation changes in semi-desert landscape of south-eastern Arizona that in 1905 it was reported that 'every tree over seven inches in diameter had been cut and used for fuel within 10-mile radius of Tucson (a town in Arizona)'. The Bishnois living in one of the most densely populated desert regions in the world evaded this situation by using alternate fuel sources. One of the 29 rules which says not to cut green trees led them to come with alternate solutions. Bishnois use fallen twigs and branches or dead trees for cooking purposes, Bishnoi women walk miles to collect these, also they use dried cow dung as an alternate source of fuel wood. Although in current times the government has provided LPG gas to every household which is a clean and greener source for cooking and not many Bishnois use the traditional way of cooking anymore,

unless it is an occasion. The Engineer from Jodhpur told me that 'Nowadays only 10-20% of cooking is done in traditional way on fire rest everyone has an LPG stove. But there are some poor people who cannot afford one, so they use firewood or dried cow dung for cooking.' Looking from a perspective of Bishnois, they had to walk for miles in scorching heat to find fallen wood and then to cook later instead an LPG gas is convenient for them. But looking from a point of traditional practice there is a loss here.

Rainwater harvesting

During the severe droughts in western Rajasthan in the 15th century, Jamboji built many rainwater storage tanks called *kunds* (Reichert, 2015). The Bishnois have been following the trend since then, they know that they have shortage of water, so they started constructing rainwater harvesting tanks while constructing their house. My informants told me that they have a collecting area at the terrace which leads the rainwater into the tanks that is made in the front of the house. Mostly the water is used for drinking purposes only and water saved from the monsoon season can last up to 6-8 months. These tanks are built when the house is constructed and serves as a lifeline in desert. Though Bishnois of Rajasthan has it in every household especially in villages but my Bishnois respondents from Haryana did not have these rainwater harvesting tanks. To which one of my respondents a student from Haryana told me that 'We have enough rainfall in Haryana, it is done in Rajasthan due to its arid geography.'

Burying the deceased

Bishnois are said to be the followers of the Hindu god Vishnu (P. Jain, 2011), and many of my informants agreed to it and they visit Hindu temples and follow the Hindu traditions and rituals. But the fact that Bishnois do some things differently than Hindus and one of them is that they bury their deceased ones. Whereas in Hinduism it is strictly prohibited, and dead bodies are supposed to be burnt. Though there is no such thing mentioned as burying the dead ones in the 29 rules but just the fact that, burning someone will require a huge amount of firewood and as mentioned in the 29 rules not to cut trees, therefore Bishnois tend to bury dead people instead, and is strictly followed by all the Bishnois even today.

Other miscellaneous sustainable activities

Some of Bishnois daily life chores includes some sustainable aspect to it, they use ash left from the fuel they use for cooking to wash the utensils, they say it makes the dishes shine and deeply cleaned as well. Not to mention that ash is an organic material further causing no harm to any organism after its use. Not only that but Bishnois used to use fruits of a tree called soap nut tree (*Sapindus mukorossi*) to wash their clothes which is again an organic material. Also, the ladies of the house used diluted buttermilk to wash their hair and to shower. All these organic methods were a part of Bishnoi lifestyle, not so much now due to the acceptance of modern methods and materials because of their convenience.

Bishnoi lifestyle is ecologically sustainable, with all the above rules they follow and the daily chores they include are to some extent sustainable. Not only that but Hall (2011) after studying ecological dimensions of Bishnois inclusive of the blackbuck and vulture populations with the density of Khejri tree in Rajasthan for years found that, all the three species are positively associated with the

presence of Bishnoi people. It is true to say that Bishnois make a haven for wild animals and birds, which aligns with what Pimentel et al., (1992) concluded that most biodiversity existed in human-managed ecosystems.

5. DISCUSSIONS

The discussion will be done in two parts, in the first part I will discuss my results in relation to existing insights and theories. The second part of the discussion will be about the theory used in the thesis and how my work adds up to scientific discourse and open new doors for understanding the Bishnoi community.

5.1 Discussion of results

Modern Bishnois are different from traditional Bishnois. Where young Bishnois see the rules from a scientific point of view and talk about sustainability and conservation. Whereas for traditional Bishnois following the rules is a form of duty. But the impact of urbanization is evident on Bishnoi lifestyle. Bishnois in the whole study are described as a separate sect from any religion apart from some commonalities to Hinduism. The exact number of people following this sect is not available. I have used population data from Reichert (2015), who says there are close to a million Bishnois. There are some other online data on their population, but none are reliable. Also, Bishnoi are not noted separately as a cast or tribe under the Indian constitution, so there is no government data for their population count separately. Therefore, I have taken the urbanization data of Rajasthan as a whole for representation of Bishnois. Below I will discuss my results and insights during my research work.

I found Bishnois knowledge subjective as it is an interpretation of the community. Which is in alignment with epistemology of critical theory, according to which knowledge is subjective and is constructed between individuals and groups, and it was constructed based on their needs at that time. For Bishnois as a community they followed these 29 principles which helped them survive in the arid conditions of Rajasthan for centuries, which also makes these rules area specific. Bishnoi people still follow them, or at least try to follow most of them, as there are changes in the traditional livelihoods. Modernization, easy access to market products, outmigration and influence of other cultures are making traditional livelihood fade away in the case of Bishnois. They are known because of their strict principles which focuses on environmental conservation and sustainability. There is literature on the practices of Bishnois and how they have been protecting nature for centuries but almost all of them are romanticised. No doubt that Bishnois have been doing conservation for ages and they put environment conservation before themselves, but with modernization taking a toll over traditions and traditional knowledge around the world Bishnois are no exception to it. Their loss of knowledge might not be at a same pace as other traditions, but to which Boyd and Richerson (2005) said that cultural change and the rate at which it changes varies across different cultures and time periods. To observe the knowledge loss of Bishnois I categorised their knowledge as TEK because their knowledge and their environmental laws are not categorised in a single framework. I have discussed above in detail in the chapter of theories that different researchers talk about their knowledge differently. So, I personally saw their knowledge in alignment with TEK. I moved further with TEK as it is a widely recognized terminology with many international forums and international governing bodies (i.e., IPBES, GBO, Report of the world commission on environment and development etc.) and its importance is known and shared globally throughout.

TEK can be used in environmental assessment, it can provide models for sustainable resource management, and it is also important for protected areas and conservation education. Bishnois knowledge which helped them to survive in the thar desert for past 500 years in a sustainable way, which also helped the biodiversity of the region to flourish. Bishnoi villages hold a greater number of wild animals than adjoining places, it means that their livelihood is sustainable and can support wildlife as well. Some people in the adjoining villages top Bishnois have started to follow them, their methods of rainwater harvesting, not cutting trees because they saw Bishnoi benefit from these practices. Bishnois have had success in conservation and sustainable living and there is enough evidence on that. Their way of life can be explored and be used in conservation practices, at least in similar landscapes across the region, as most of their practices are areas specific.

I wanted to understand the right way to look at Bishnois livelihood and their practices. The complex form of knowledge they carry has been categorised differently by different authors, according to their own perspectives (Hall and Hamilton, 2014; Hall and Chhangani, 2015; Bikku, 2019; Kala and Sharma, 2010). Whereas I saw their livelihood practices in alignment with TEK. The benefits of studying Bishnois from the perspective of TEK was that, firstly it is a highly studied topic with lots of literature available online making it easier for comparison. Secondly loss of TEK is also a well-studied topic which was helpful for me as I was analysing the threats to the Bishnoi livelihood. TEK served the basis of my work and my results highly correlated with it. Tang (2012); Tang and Gavin (2016), became the basis of my research for TEK loss of Bishnois. Their loss of philosophies and livelihood is not previously discussed by anyone, except for Reichert (2015), who briefly discusses in her last chapter of her thesis about the generation divide in Bishnois in the contemporary moment, explaining how modern/young Bishnois look at their sect differently from their elder counterparts. Which makes this research results a small contribution in this field.

Also explaining how modern education and moving away from village can affect their morals and ethics to an extent, which can cause a threat to the knowledge system. This was a brief insight about their knowledge/value loss, and I tried to elaborate it. I saw Bishnoi philosophies and livelihood from a lens of TEK where ecological sustainability was given a great importance (as Bishnoism revolves around that). As described by Reichert (2015) that young Bishnois lifestyle has been altered due to various modern factors of market integration and outmigration of people from villages. I used here the framework from Tang and Gavin (2016), to see the categories of threat and how it aligned with modern Bishnois. I narrowed the threats down to 3 categories, which according to my research are the main threats to Bishnois livelihood and to their knowledge namely: a) Change of traditional livelihood practices. b) Loss of pathways of TEK transmission and c) Change of traditional religion and beliefs. These threats mainly occur when people move away from villages and from their traditional way of living, and as far as my research goes almost all my participants were living away from their village and traditional lifestyle either temporarily for jobs or education or permanently settled there. But what I found interesting about Bishnois is that, even living away from their villages, and their traditional lifestyle they are so dedicated to their sect. and Jambeshwarji's teachings that they try to follow as many principles as possible from the 29 principles. Mostly all my respondents visit their village every now and then during holidays, and they mostly follow their traditional way of living there. Be it planting trees, feeding wild animals, harvesting rainwater, or even finding dead trees and branches for using it as firewood and later using the ash for washing utensils. But even though people try to follow as many principles as possible, but they majorly miss a lot of them for which they are known for. Living in cities away from villages, Bishnois no longer engage with wild animals

or play a role in their conservation, similarly for planting trees or using traditional and sustainable methods of cleaning are lost as easier alternatives are available due to market integration, which indicates the loss of TEK. Bishnois lifestyle is sustainable at least for people living in the villages but not so much for the people living in cities or towns. But with increasing urbanization and more and more people moving to cities the TEK is in threat and will need to be conserved.

5.2 Discussions of theory

The plethora of concepts under which Bishnoi practices are categorized makes it confusing. But I tried to look at Bishnoi livelihood and philosophies from the lens of TEK, and I found the alignment in their practices to what TEK is explained by various researchers. Their knowledge and practices if recognized by government and non-government agencies or global forums, can lead to inclusion of their sustainable practices in conservation or sustainable livelihood practices. The 18th target of Aichi Biodiversity targets was to increase in the recognition of the value of traditional knowledge, innovations, and practices of local communities, which are relevant for the conservation and sustainable use of biodiversity. Recognising Bishnoi efforts as TEK they can be recognized by these agencies. Not only efforts to conserve this livelihood and knowledge will increase but these values could be explored and followed in different places, which could help conserve biodiversity of the areas and help in sustainable resource use.

During the study, I found some interesting insights that I would like to discuss. They particularly do not connect with the research questions, but these points provide some extra information and open up new doors to the Bishnoi knowledge system.

Age group disparity amongst the Bishnois: I segregated my participants in two age groups. Young (between the age of 20-30) and older Bishnois (between age 30-70). As nowadays young people are getting more educated, and they talk about science and sustainability. Young people also follow the rules simply because they are said so by Jamboji. For example, one of my respondents Praveen Bishnoi an engineering student from Haryana said that not wearing blue clothes today is not important, as it makes no sense to follow it now, but older Bishnois will still follow this rule as it is mentioned by Jamboji. Whereas young Bishnois are merging the scientific environmental discourse with the traditional religious practices, and they talk about sustainability and conservation, they are studying law and creating NGOs to take environmental conservation beyond their sect. NGOs like Bishnoi Tiger Force (BTF), who were responsible which started in 1999 as a movement after the Indian actor Salman Khan allegedly killed a blackbuck, but later in 2007 formed an NGO (Rahman, 2020)

Comparison between Bishnois of Rajasthan and of Haryana: I found that Bishnois of Rajasthan are more engaged to their roots than Bishnois of Haryana. Bishnois moved from Rajasthan in past couple of years due to the severe droughts in the region. They reached Haryana a state north to Rajasthan in search of more fertile land. What I found in my study is that Bishnois of Haryana try to follow as many rules as they can from the 29 rules, but their lifestyle is little different to the Bishnois of Rajasthan. Bishnois of Haryana have a stable source of water, so they do not harvest rainwater. Taking care or protecting animals in the region of Haryana is also not that frequent due to the less occurrence of animals in those regions. They also are more influenced by other cultures as they have

migrated from Rajasthan many years ago and this distance may have caused losing the touch to their tradition.

Other people influenced by Bishnois: Bishnois are influential and proud people, they are not shy and are always ahead in tasks like nature conservation, animal protection etc., because their religion revolves around nature, and they live in close contact with nature. Bishnoi people often share their lifestyle with friends and colleagues from different backgrounds and influence them to conserve nature. Most of my respondents do that and they say people get inspired by us and even try to follow us, especially adjoining villages to the Bishnoi villages learn from them and plant trees. One of my respondents a 61-year-old government employee at railway department from a village near Jaipur, Rajasthan told me that 'we harvest rainwater since almost 25 years now and even our neighbours who are from a different cast, they have started to do it as well after seeing us'.

Adaptations to the sect: There have been changes in Bishnoi livelihood as a community. People who have moved away from villages tend to follow comparatively less rules than people who still live in the villages, which implies that changing locations as a Bishnoi impacts your traditional values and livelihood. As modernization is taking over and it is said to be as an easy way of life, people are moving more towards it giving away their old lifestyle. But even when Bishnois move away from their villages they try their best to follow their tradition. Exceptions of helping animals and feeding them might not be possible as the 29 rules are location specific, and people are not able to follow them when they change locations. But the values and ethos of Bishnois remain the same, they remain generous and kind irrespective of where they are. They never eat meat and try to plant trees whenever they can. They feed birds and animals whenever possible and donate a part of their earning for either wild animals or any other good cause. There is a loss of knowledge, practices and even language. But it is not dramatic. As most of the Bishnois live in villages even today the values are held there well but with changing times and modernization more people are moving to cities and even villages are being urbanised leading to dependence on modern products and equipment. The way modern Bishnois are adapting to their tradition while being in their modern life is something to look upon. The TEK is at risk for them, but they approach their tradition in a scientific way as well. A recent news article says "The Bishnois of Rajasthan are now using education in their fight to protect the environment" (Rahman, 2020). Where formal education was one of the reasons for their TEK loss, in a way Bishnois have adapted it to make it as a tool for their TEK to modify.

5.3 Research Quality and Limitations

i) Validity and Reliability

During my work I have been thinking about how my work can be reliable and how others can reproduce my study if they want to. Generally, validity relates to the degree to which a research is trustworthy or if it is interpreted in a correct way. Whereas reliability we try to establish whether the study could be repeated by another researcher or at another time with the same results (Drucker-Godard et al., 2011). During my research I have tried to keep it validated and reliable, I have tried to triangulate my data. Which means I have been using different sources of data, which could include different times for data collection, different places from which data is collected and different people

who could be involved in the research study (Wilson, 2014). I systematically interviewed several people with different age group but asked them the same questions, which makes the data reliable. The term Bishnois were searched and literature on them was gathered through several search engines like Google scholar, Elsevier, and Science direct. These literatures were thoroughly studied and compared with my data collection for reliability. The references list has the literature used in this article mentioned for further details.

ii) Limitations

This thesis encountered certain limitations which might have affected the quality of the work. But there are some limitations in qualitative research that cannot be avoided i.e., researchers personal bias, language translation and interviewing people online in my case. Ideally the research would be carried out in villages of Western Rajasthan and Haryana in northern India but due to the covid-19 pandemic, it was not possible to travel their anymore. Therefore, an alternate method was taken and that was to take interviews online. Which was not an easy task and took an unprecedented amount of time to get contacts and snowballing more contacts from there. As the interviews were carried online not everyone was willing to have an online face to face video chat, so an audio call was preferred to respect the anonymity of the interviewee. Being not physically present in an interview can cause certain limitations, as follows:

- One cannot read the facial features or the body language of the interviewee, which can lead to loss of observational data.
- On the other hand, the interaction is not that engaging as there is loss of physical presence.
- Carrying long interviews online is also hard and a person might skip information which would not have been the case otherwise.

On the other hand, the number of people I was able to contact online was 12, which might seem less, but the incoming information was saturating, even though I would like to interview more people, but it was hard to contact more people due to their unwillingness, limited usage of electronic devices by older people in the community and internet connection problems. All these aspects should be considered before online data collection which can cause certain limitations.

Lastly there was the shortage of data on Bishnois online. Most of the Bishnois text and literature are in hard copies available in libraries across Rajasthan in India which I was not able to access. Whereas there was only a limited literature available of them online, especially on the current scenario of Bishnois or change in their knowledge which hardly had any literature at least online.

6. CONCLUSION

Bishnois conservation activities have been going on for centuries. Their sustainable livelihood even continues today. Bishnois value their principles a lot and for them following the rule means everything, but due to modernization people moving out from villages. Making it hard for them to follow the principles as these principles are location specific. Rapid modernization globally and particularly in India for the past 4-5 decades have changed a lot in terms of reliance on food accessibility of products, education, and culture. Modernization has changed these things. It has opened new doors for easy access for villagers to modern technology, better road infrastructure and western education. People accepting this modern way of livelihood suffer an undermining cost, that is the loss of their own traditional livelihood. Less reliance on agriculture, not speaking in the local dialect anymore or not learning the traditional way of living in the village can lead to the demise of the culture. Despite being disconnected to their village life, modern Bishnois seem to retain the basis of the sect. That is to respect each living organism and to use resources sustainably and share them equally amongst other beings. Modern Bishnois away from villages are not able to protect animals, or to plant trees often but would do it whenever provided with an opportunity. Whereas donation of money for good cause and animal shelter is common against all the people. There are many cultural changes in modern Bishnoi lifestyle but there have been adaptations as well. Bishnois living away from villages often go to their village during holidays and engage with traditional lifestyle and in some cases engage with agriculture. They donate money to wildlife shelters or for any other good cause irrespective of where they live. A Bishnoi feeds animals or birds every morning when they wake up, even before they eat themselves. Apart from the adaptations Modern Bishnois are using education (by studying law) as a tool to combat illegal poaching. Whereas their willingness to go back to village and live their traditional life once they are in their middle age, shows the belongingness one feels to their place of origin and their tradition.

Bishnoi practices can directly be linked to TEK. As TEK is identified as a form of technique practiced for a long time that connects people to the natural world and when these interactions are carried out for many generations becomes TEK. With Bishnois that is exactly the case. People realised at one point that the way they are living is not sustainable and can create threat to their own life, so they started to adapt. It started out as a set of 29 rules that a Bishnoi must follow to lead a better life but not in a selfish way. They realised that to be successful we need to help others as well. To share resources with others is a way to succeed. All these selfless acts and putting nature above themselves became a part of their life. These rules were no more memorized, they became a part of Bishnois, so much so that the name of the community reflects it itself. Bishnoism is a long-term evidence-based success of human nature interaction where both parties have thrived. It all had happened because the people who gained this knowledge passed it on successfully to future generations that even till date are continued.

This traditional lifestyle of Bishnois have been successfully thriving in Rajasthan because it is modified in a way to survive in desert region. With time, in Bishnoi villages not only human population flourished but also the population of wild animals and tree cover has increased. Not cutting green trees and harvesting rainwater, made Bishnois life hospitable in the scorching thar desert. Where once people had to walk miles to get water for drinking, they have their own rainwater harvesting tanks. The compassion they show towards animals by feeding them with their

own harvest every season, valuing every living organism, shows the ecocentric lifestyle of the community. Upto recently Bishnois extensively used fallen twigs and dried cow dung as fuel wood for cooking and then using the ash from the firewood as a dish washer. This ecocentric lifestyle is the reason why they thrive irrespective of all the hardship they face climatically, and it made them a recognized community around the world.

Despite their knowledge has helped them to survive for centuries, but modernization has impacted their lifestyle extensively. Young people moving away from villages already puts the future of Bishnoi livelihood to threat. Not only people leaving the villages but villages themselves are being infiltrated by modernization, pushing people away from living a traditional lifestyle. Even though Bishnois are adapting to the modern lifestyle while they continue to live with their traditional values, but to some extent values and practices are lost.

FUTURE RECOMMENDATIONS

As I was unable to go to India for field work due to the restrictions of travel due to covid-19 pandemic, so I had to collect the data online instead. So, I have certain recommendations for future study and things to do differently below.

- My first recommendation would be to carry unstructured interview, focus group interviews and participant observation, to get in depth information.
- Secondly, I would recommend connecting to someone (a mediator), who knows the area and the people better. Which will not only save you a lot of time but will also guide you through the area, making it easier for you to meet your target study group.
- Lastly, I talked in this research mostly about Bishnois livelihood the threat to their knowledge and practices but what could also be important to look at in the later research is how to conserve their knowledge. As Bishnois philosophy is a complex body of knowledge and it is still followed by people who are no longer living in villages, which makes it a little hard to track the extent up to which the knowledge is being lost is not clearly identifiable but could also be something to look after as well.

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ANNEX 1 In detail connecting Research questions to Interview questions

Sub RQ	Key elements in RQ		Interview questions about key elements
General introduction		Introduction	What is your name, age, and your occupation?
		Introduction	Where do you live? In village/town/city? If you live in a city, why and why did you move from the village? If still in a village, why?
		Introduction	Are you studying or working? Where do you study/work and why?
		Introduction	Where do your parents and elders (grandparents) live? Why?
How can the Bishnoi community and their present-day livelihoods be characterised in social sense?	Bishnoi community	Bishnoi community- No change in livelihood.	Do you consider yourself as a Bishnoi? And is your community made of Bishnoi people mostly or are there other communities living together as well?
		Mixed community- Change in livelihood.	
		If different- no change in livelihood	What do you think about your (Bishnoi) community and the Bishnoi lifestyle?
		Not different- change in livelihood	How is it different from other people and communities?
		Strictly follow the rules, no loss of tradition. No change in livelihood.	How important are the principles for you to follow? Do you follow all the 29 principles given by Jamboji? If not, which ones are not followed, and why?
		If some rules are not followed, loss is there. Change in livelihood.	
		If yes, change in the lifestyle	Are there any hierarchical difference between the rules? Are some important over others?
		If no, no change in lifestyle.	
		If yes, no loss of knowledge.	How important is the basic philosophy of the Bishnoi that all living beings have a "right to survive and share

			all resources," to you?
		If follow these rules, no loss, if do not follow or compromise is there, then there is a loss.	Do you donate 10% of you grains/earning (If you are earning) to wildlife welfare and protection? Or your parents? Or do you provide any kind of provision to the any social or economic functioning of the village?
		If follow these rules, no loss, if do not follow then there is a loss.	Do you donate to the temple so that they can maintain animal shelters? Reasons for doing it or not doing it.
		If follow these rules, no loss, if do not follow then there is a loss.	Do you provide wild animals and birds with food/grain? If yes, when, and why? If no, why not?
		If follow these rules, no loss, if do not follow then there is a loss.	Do you harvest rainwater for your uses? Reasons for doing it or not doing it.
		If follow these rules, no loss, if do not follow then there is a loss.	Do you still use traditional soap nut (reetha) to wash clothes, ash and sand to wash utensils and diluted butter milk to take shower? Reasons for doing it or not doing it.
		If follow these rules, no loss, if do not follow then there is a loss.	Do you maintain Orans (sacred groves)? Reasons for doing it or not doing it.
	Present day livelihoods	Moving to city loss of traditional lifestyle.	Where would you prefer to live? A city/town or in the village? Why, reasons?
		If agreeing, there is loss of knowledge	How much is the importance of modern/western education for you? Do you think it has an impact on Bishnoi lifestyle? If yes, reasons.
		If nothing is being done, there is loss of culture and tradition.	What do you do on a regular basis to protect animals and plants? If nothing, what are the reason behind it?
		Location affecting the tradition is loss of culture.	Do you help animals in need irrespective of your location? Why, why not?
		Sustainable lifestyle, and others learning from them.	Do you often share this lifestyle with others (friends/relatives etc.) non-

			Bishnoi people?
		If yes, tradition and culture retained.	Do you pray regularly? And do you strictly follow a diet? Reasons for doing or not doing it.
2. To what extent are Bishnois philosophies and livelihoods underpinned by traditional ecological knowledge and how do cultural changes and adaptations take shape?	Philosophies and livelihoods	If they have a relation as described earlier then TEK retained or else knowledge loss.	What kind of a relation do you have with other non-human living organisms (animals and trees)? To what extent the rules of Jamboji play a role in it?
		If importance given to environment rules then, TEK retained, or else not.	Are some principles important to follow than others? What importance does the principles related to environment hold for you?
		If yes TEK loss.	If you move from one place to another or outside village, does the location change makes it difficult to follow the rules?
		-	Do you believe in the concept of reincarnation? Why, why not?
		TEK knowledge passed on from generations if yes.	Do your parents share knowledge of survival in the desert with you? With reasons.
		If yes Tek is present	Do you believe in the philosophy of live and let live (basic Bishnoi philosophy)? And that every organism has an equal right to share resources? Reasons.
	Cultural changes and adaptations	If yes, culture retained, If no cultural loss	Which language or dialect you speak in? If not the local dialect, then which dialect or language with reasons.
		If yes, culture is retained. If no culture loss	Do you still dress traditionally (wear white clothes if you are a man and if a woman, do you still wear sari of red or red and yellow colour)?

		If yes, culture is retained. If no culture loss	Do you follow/perform traditional songs and dance. Can you sing songs in local dialect? If no, why not?
			Which principles amongst the 29 you feel, are less important to follow or would not be as important to follow compared to some others?
		If no, culture is retained. If yes culture loss.	Do you find any difference between your lifestyle compared to your parents and grandparents? If yes, what differences?
			How important is Bishnoi traditional knowledge and culture for you? Would you like to retain it and pass it on to future generations? With reasons.
		If no, culture is retained. If yes culture loss.	Do you think there is a cultural change in the Bishnoi community? If yes, what might be the reasons? Do you think that globalization and digitization play a role in Bishnoi cultural change?
3. To what degree Bishnoi's philosophies and livelihoods be characterised as environmentally sustainable and can be compared to key elements of ecological sustainability?	Environment ally sustainable livelihood	-	Do the environmental principles have special significance for you? Why, why not?
		If yes, then lifestyle sustainable if not then sustainable	Do you still not cut green trees and use alternative fuel source instead? With reasons.
		-	Are you careful while buying clothes dyed with indigo? Why, why not?
		If yes, then lifestyle sustainable	Are their Orans (sacred groves) in the area where you live? If yes, do you participate in its

			management and take care of it? If not, why not?
		If yes, then lifestyle sustainable	Do you plant trees often? Do you take care of green trees and take it as your moral duty to protect it?
		If yes, then lifestyle sustainable	Do you participate whenever provided with an opportunity or circumstances to conserve wildlife?
		If yes, then lifestyle sustainable	Do you cremate or bury your dead ones? Which one of the either, with reasons?
			As a Bishnoi what is the significance of not cutting a green tree? Why is it important for you?
	Comparison to ecological sustainability		What do you use as a fuel source for cooking and other purposes?
			What is the significance of protecting wildlife for you?
			Do you plant trees and take care of them? If yes, reasons for doing it.
		If yes, then lifestyle sustainable	If you have an agriculture land, do you keep a separate harvest or a patch of agriculture land for wild animals and birds to feed on? If yes, reasons.

ANNEX 2: Pinpointed location of participants in the study from India

