

Xinjiang Uyghur's local knowledge of ecological protection: the case of water resources protection in Hotan, China

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ABSTRACT

This study focuses on the influence of local knowledge in water resources protection. Based on an empirical study on water resources protection in Hotan, China, the study found the following major results: (1) the impact of local knowledge on rural ethnic areas is very important, even surpassing the importance of science and related policies; (2) local knowledge is historical, practical, and empirical, most importantly, it is sustainable, it supplements ecological protection and aids sustainable development; and (3) the local knowledge of Xinjiang's Uyghur can also be adapted to by local residents in other arid lands experiencing degradation. These findings provide a reference for researchers, policy makers, and environmental regulators, both in China and in other regions of the world, to further explore the influence of local knowledge on the impact of water resources protection and sustainable development.

Keywords: Water resources protection; Ecological protection; Local knowledge; Sustainable development

1. Introduction

In recent years, Hotan region has been in the spotlight for its ecological and environmental protection initiatives. Some notable preliminary achievements include the wider application of environmental technology, the implementation of environmental laws and regulations, the establishment of a formal environmental regulatory system, and the gradual rise in public awareness about ecological issues. The concept of environmental protection began gaining acceptance in Xinjiang Hotan region through various modes such as social production. However, on the whole, the trend of ecological destruction in the Hotan region of Xinjiang, China, has not been effectively curbed. The quality of ecological environment continues to deteriorate, the environmental protection system is not sound, and environmental protection measures should be implemented more stringently. Further, environmental education is not as

widespread as it should be, thus contributing to ecological degradation and depletion. In view of the present situation and characteristics of ecological protection in Hotan region of Xinjiang, it is urgent to explore a sustainable development model of ecological protection, suitable for the on-ground situation prevailing in Hotan region of Xinjiang. Ecological protection, however, requires cross-disciplinary knowledge, which is an amalgamation of information sciences, social sciences, management sciences, and other related natural sciences.

2. Conceptual background

2.1. Definition of Xinjiang Uyghur's local knowledge

Local knowledge includes all types of culture-specific information, including skills, taboos, customs, behavioral norms, and traditions with regard to ecological protection.

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This knowledge is based on local experience, wisdom, cultural practices, and histories, and is mainly owned by the locals [1]. This article specifically refers to the local knowledge that is integrated into the common people’s mannerisms and specific social and cultural customs, and is consequently observed as patterns of behavior or norms. Such knowledge imposes very strong behavioral constraints on the members of that society. Particularly, in the case of Hotan, Xinjiang, the local knowledge is “strongly rooted in a particular place” [2]. Furthermore, local knowledge is composed of local experience, practices, habits and religion. Local knowledge encompasses various areas, all of which play a role in ecological and environmental management, especially water resources protection [3]. Given its geographical location and uniqueness, the local knowledge of the Uyghur residents of Xinjiang’s Hotan region, relative to other ecological protection methods, has the following three advantages: (1) it is considered as more acceptable; (2) it can be inherited, and (3) it is true to the local conditions. The Hotan Uyghur residents’ traditional local knowledge is highly specific in terms of the time, background, and historical conditions during which this knowledge was generated. Moreover, this local knowledge has adapted to nature and its transformation over time. Thus, it is in harmony with nature, spirit, and culture of the region. Given this important history and connection, the local knowledge of the Uyghur residents of Xinjiang’s Hotan region forms an important reference for the future of the Uyghur people in the region [4]. Given the important part it plays in the ecology of the region, the local knowledge of the Uyghurs in Hotan region is irreplaceable in terms of new culture creation. Consequently, although local knowledge may not be conventionally considered as an important part of ecological protection and sustainable development initiatives, it is an important supplementary specification [3,5].

Because of its self-sufficient agricultural economy, lack of scientific application, poor acceptance of modern ideologies, feudal society, and religious and superstitious convictions, the traditional culture of the people in Xinjiang is marked by a certain degree of isolation [6]. Inevitably, the people living in a given environment brand it in terms of their way of thinking, behavior, lifestyle, and customs [7]. While many studies have assessed the development models of ecological protection for the arid inland, border, and ethnic minority areas in the Hotan region of China, they have failed to consider the significance of ethnic groups in the ecological protection modes practiced in such areas. Moreover, there is a lack of comparative research

on developing countries with a similar climate/ecology, with regard to water resources protection regulations and characteristics.

2.2. Theoretical framework

This study refers extensively to the local knowledge of the Uyghur people in Hotan (hereafter “HULK”), and identifies the most effective methods of water resources protection by combining the following three aspects into the HULK model: laws and regulations pertaining to water resources protection, culture and education, and public participation (Fig. 1). The “+” sign could be considered a connection and integration [8]. It could refer to a policy/regulatory link, a talent platform, or a service connection intended to achieve ecological protection and HULK docking and matching. In doing so, the people of the region would advance toward water resources protection sustainable development.

2.3. Study area

Hotan is in China’s Xinjiang Uyghur Autonomous Region located in the hinterland of the Eurasian continent (Fig. 2). It is located at the southern edge of the Tarim Basin. To the west lies the Tian Shan Mountain block, which blocks moisture exchange with the Atlantic Ocean. The south is blocked by the Kunlun Mountains, which again blocks moisture exchange as the low-latitude warm and humid air from the Indian Ocean cannot enter the region, thus giving rise to a typical warm temperate continental arid climate [7]. Thus, the region is subject to extreme drought, scarce precipitation, and high evaporation. The average annual precipitation lies below 50 mm, the average annual evaporation is above 2,400 mm, and the diurnal temperature difference. The region has recorded annual sunshine hours of 2,470–3,000, while its average annual sunshine percentage ranges from 8% to 60%, with the maximum value reaching 84%. Hotan region experiences the northeast wind and northwest wind interchange, and hence, sandstorms occur frequently, especially from March to May. These prevent plant growth as the area is often filled with sand. The natural ecological environment of Hotan is characterized by (1) a closed geographical environment, (2) fragile ecology and serious land desertification issues, (3) poor land productivity and low biodiversity, and (4) poor soil fertility and excess salinization.

Uyghurs comprise the majority in this multi-ethnic region. In 2013, the jurisdiction of Hotan region covered seven counties (Hotan City, Hotan County, Pishan County,

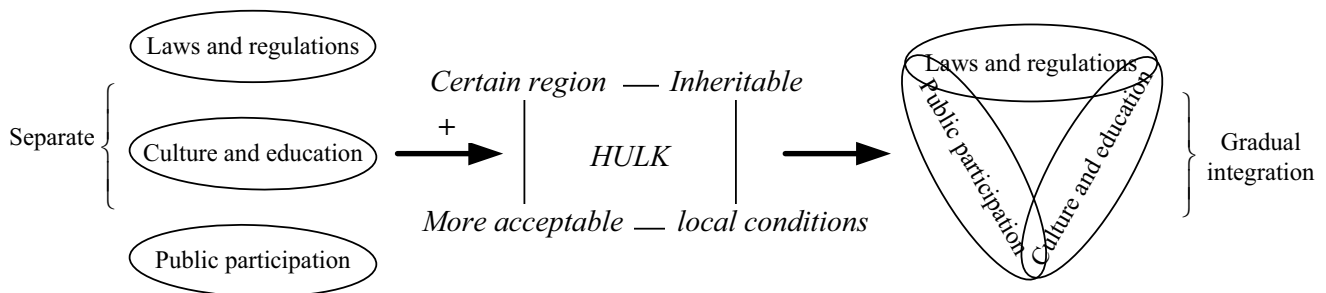


Fig. 1. Theoretical framework.

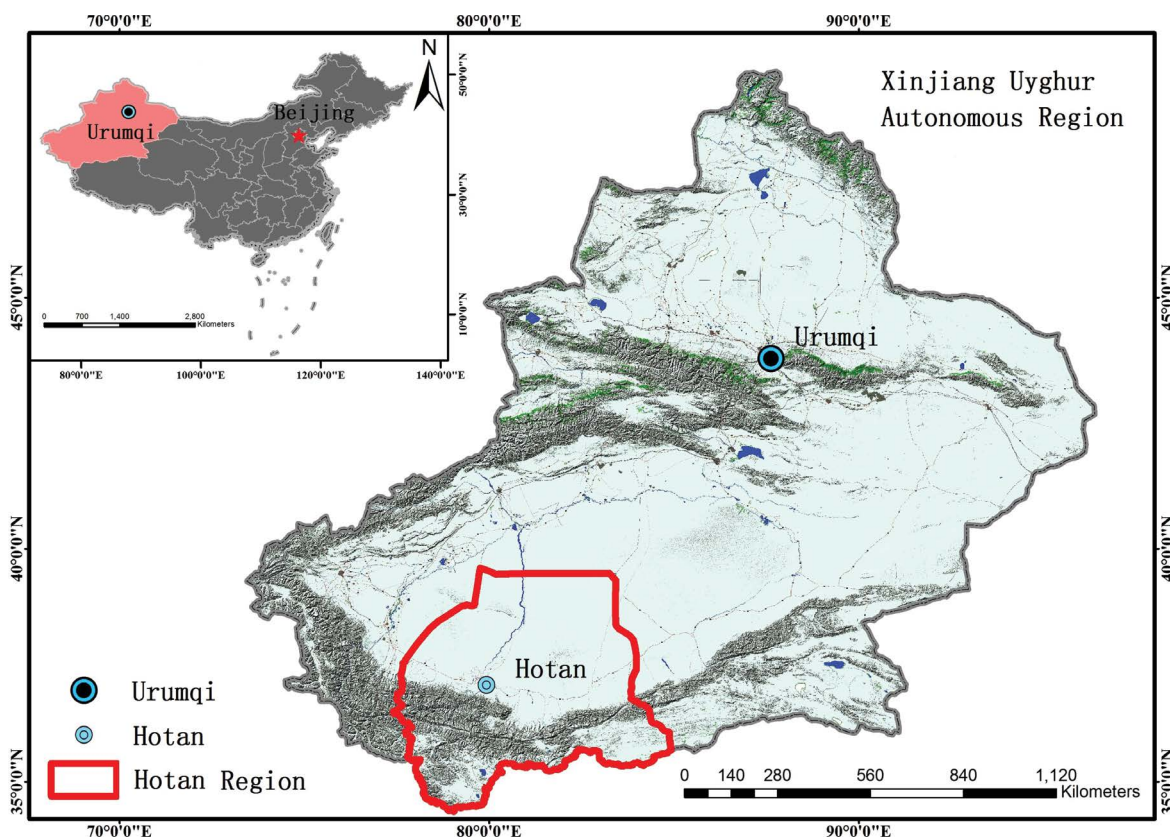


Fig. 2. Location of the study area in Xinjiang, China.

Yutian County, Moyu County, Luopu County, Cele County, and Minfeng County), 1 city, 91 townships, 13 street offices, 1,384 administrative villages, and 98 communities. The total area is about 2.48×10^7 ha, of which mountains and the desert account for 33.3% and 63%, respectively, while oases only make up 3.7% of the total area [7]. The total population of Hotan region is 2.29 million, of which Uyghurs account for about 96.4%, Han about 3.4%, and other ethnic groups 0.2%. The population growth rate is 4.6%. The agricultural and non-agricultural populations comprise 86% and 14% of the total. The majority of the residents are followers of Islam. Hotan region is a fan-shaped area, spanning 670 km in the east-west direction and 600 km from north to south. The ecological environment in the Hotan is extremely fragile.

2.4. How HULK can play a helping role in implementing laws and regulations

Compared with the inland cities, the ecological protection work in the Hotan region started late, and its foundation, in terms of the regulatory system and capacity, was weak to begin with. Simultaneously, the ecological protection agency for Hotan village was not well organized; there were no dedicated environmental agencies and full-time officials below the county government level. Rural environmental monitoring was non-existent. Ignoring the ecological environment often becomes a “rational” option for the local government in pursuit of economic development, and policy implementation often conflicts with the government’s purpose and

intention [9]. The environmental protection policy is flawed in the following two respects:

- At the rural scale, the market mechanism cannot play its intended role with regard to resource allocation. There is no clear property rights system for rural environmental resources. Although the property rights system exists, the people mistrust it.
- There are several policy gaps and system defects. China is in a period of economic transition, and is thus prone to huge policy system gaps and system defects. The widespread ideology of “development first, environmental protection later” or “pollute first, then clean up” is the root cause of China’s low ranking in environmental sustainability [10]. Generally speaking, the typical characteristic of the country’s environmental management system is its emphasis on administrative coercion and the lack of an appropriate induction policy [11]. The government’s intention has been good but has met surprise [10].

Therefore, this paper proposes that the discussion of water resources protection should not ignore HULK. All policies in this regard should consider issues related to poverty as well as financial and technical support. The active participation of the local people and their capacity building are a must for improving Hotan’s ecological environment [12–14]. This would also help reduce the isolation of the local Uyghur-based ethnic minorities and achieve the intended effects.

In recent years, the Chinese government has further intensified its efforts toward ecological protection by formulating a series of policies and regulations. How do people ensure that these ecological protection policies and regulations are “down-to-earth” and acceptable to the people of Hotan region [5,15]. Thus, we advocate the use of HULK. Specifically, the “HULK + Laws and regulations” model can be used for water resources protection, and further sustainable development in the following manner:

- **Afforestation:** HULK foundation is love flowers and trees, and guide the Uyghurs to returning arable land to forest (grass), afforestation policy and their LK culture in the ecological protection consciousness together, they are more easy to accept. The Uyghur have a saying: “the hand that uproots trees will be hurt.” It is crucial to protect the trees, to maintain a water balance in the soil, and effectively prevent the desertification of the land and water resources protection [11,12]. Such ecological protection consciousness will help further sustainable development.
- **Protecting water resources:** Hotan Uyghurs are forbidden to urinate in the water, cannot spit in the water, not allowed to bath in the spring, cannot pour the contaminated dirty water containing chemical substances such as washing powder into the canal, cannot let livestock directly drink water in the canals.
- **Establishing a demonstration village:** Demonstration households serve as leaders, and can communicate with the masses with their experience. They can help promote useful new technology, using HULK as the medium to build a platform to disseminate the acquired knowledge. Doing so would help the application of sound and sustainable scientific and technological advancements.

2.5. How HULK can be combined with culture and education

Hotan’s Uyghur students are already conversant with their own from a very young age. After starting school, they continue to practice this traditional concept of consciousness to some extent in their daily lives. However, the teachings at school and the perspective of the teacher could affect putting this consciousness into practice. Thus, there is a disconnect between what the children learn in books vs. what they have imbibed from HULK. In addition, the close proximity to the Han culture means there is a blurring of distinctions between in content and structure: the “universal” education system followed by the Han Chinese has different social, economic, and cultural conditions [16].

As Table 1 shows, in Hotan region, the proportion of the population at the junior middle school level and below is 91.14%, and the corresponding number for senior middle school and above is 8.86%, which is obviously lower than the values for Xinjiang and the country as a whole (Table 1). Given the universally low level of education, the “market savvy” of the majority of Hotan’s people is weak; they lack technical skills, their ideas are more conservative, and they find it difficult to imbibe foreign knowledge and information.

We propose the use of HULK as a medium to inject modern information, resources, and education slowly but steadily into the daily culture of the people [17]. The author, therefore, encourages the development of the following three modes (Table 2) of HULK + culture and education through field visits and questionnaires.

2.6. How can HULK help improve public participation

Uyghur participation in ecological protection can be affected by HULK in the following ways:

- **Water-saving propaganda:** “Give hands washing water” refers to the social activities of the Uyghur folks in the rituals. The host personally or specially arranges the person to pour water into the palm of the guest and let

Table 2
Three modes of “HULK + culture and education”

Mode	Characteristic
Chinese and Uyghur training class	Popularize scientific knowledge, training professional skills
National characteristics community culture	Library and recreation room into the rural. Communities should organize team activities, for example, visiting local technology demonstration bases, labor skills competitions, football match of friendship and other activities
Home-school cooperation	HULK culture integrated into school education, respect for HULK, the establishment and development a multi-educational systems

Table 1
Hotan, Xinjiang and China percentage of population education structure

Area	Not went to primary school	Primary school	Junior middle school	Junior middle school and below	Senior middle school	College	Bachelor	Postgraduate
Hotan	3.07	45.48	42.60	91.14	4.02	3.95	0.87	0.02
Xinjiang	3.18	32.87	39.60	75.65	12.75	7.64	3.77	0.19
China	5.00	32.75	41.70	75.45	15.02	5.52	3.67	0.33

the guest wash their hands. Flushing is the basic bathing method for Uyghurs and is a customary habit. It is related to the geographical characteristics of the Uyghur people's natural environment as "water shortage", and "water saving" becomes the premise of "water use". This will maximize water savings and achieve the highest level of cleanliness with the lowest water consumption. Therefore, it gradually evolved into a ritualized folklore form of "washing water", which was passed down from generation to generation. The water for "hand washing water" could be used for the second time, for example to clean the courtyard or flush the toilet [7,9].

- **Women's participation:** More than 95% of the married Uyghur women in Hotan do not go out to work. The primary jobs of the female are housework and farming. Women are closest to the inappropriate use of water resources, and they urgent need the knowledge of water conservation. Thus, the government and environmental organizations should encourage them to become the main force to protect water resource. This can be achieved by organizing effective trainings to improve the abilities of the local Uyghur women, allowing them to participate in water resource protect. There is a need to guide and promote women toward the application of science and technology, provide them technical and financial support, educate them better, and train them accordingly.

3. Discussion and conclusion

The geographical environment of minority communities coincides with their living space. They have formed a harmonious relationship with nature, in the process of long-term adaptation and transformation, and this relationship is manifested through their local knowledge. Therefore, their traditional culture coincides to a considerable extent with the protection of the ecological environment, the functions intended to maintain the ecological balance and promote sustainable development. Otherwise, these ethnic groups could not have lasted for the thousands of years that they have. With the rapid modernization, however, the relatively closed local knowledge of the Uyghurs in Xinjiang's Hotan region has been affected by external factors, and some traditional methods including production, lifestyles, ideas, and religious beliefs are also changing [12]. The Bedouins in the Middle East are also facing such a similar situation [13]. The role of HULK alone is not enough; it is vital to combine it scientifically as "HULK +" so as to better promote the economic, cultural, and ecological environment of the region.

Ecological protection would help protect biodiversity, improve capacity building, promote ecological balance, improve people's living environment and quality, and increase social benefits. Having said that, ecological conservation is not easy; it requires matching corresponding economic, institutional, policy, scientific, and technical conditions, which may not work as intended without the consideration of local knowledge [5,18,19]. Although local knowledge is supplementary, it is important. While it is not the most important component, policy makers and practitioners should pay attention to the dissemination of local knowledge.

This study assessed the influence of local knowledge on water resource protection and sustainable development. The main results are as follows:

- The impact of local knowledge on rural ethnic areas is very important, even surpassing the importance of science and related policies.
- Local knowledge is historical, practical, and empirical; most importantly, it is sustainable. It supplements ecological protection and aids sustainable development.
- The local knowledge of Xinjiang's Uyghur can also be adapted to by local residents in other arid lands experiencing degradation.

The development of the Uyghurs in Hotan region, it is impossible to return to the feudal society and even more ancient times, but for the HULK thousands of years after the test of the traditional culture of the ecological composition of the study research, it has a real positive significance. The ecological components of the Uyghur traditional culture in the Hotan region are the result of adapting to the local ecological environment [19–21]. It is the accumulation of the Uyghur autonomous region's ecological and environmental protection and the Uyghur traditional culture in Hotan, which has better demonstrated the ecological view of the Uyghur ethnic groups in Hotan and combined with the existing ecological protection policies and regulations, educational culture and public participation, the Uyghur more easily accepted "LK+" ecological protection mode, the improvement of the ecological environment in Hotan will be effective.

The relationship between the various cultures and the desert is complex and diverse. People's understanding of the desert can be divided into two kinds. People who have not lived in the desert or on the edge of the desert believe that the desert is not suitable for living. On the contrary, people who in the desert as their homes think that the desert is suitable for living [22,23]. Only groups with appropriate knowledge of the desert region might live long and successfully in the desert. Local knowledge, as an informal system, is an effective customary "law" that applies outside of national laws and regulations. It is crucial to consider such knowledge in order to ensure social and ecological harmony [24–27]. HULK touches upon environmental awareness, which plays a definitive role in economic and social value, as it addresses the relationship between man and nature. In the future, policymakers should apply HULK to current environmental issues, in order to achieve common ground between man and nature, and ultimately, the harmonious development of Xinjiang [28–34].

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