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Analysing the Environmental Values and Attitudes of Rural Nepalese Children by Validating the 2-MEV Model

Shakil Regmi [1,*], Bruce Johnson [2] and Bed Mani Dahal [3]

[1] C/O Lindner, Didaktik der Biologie, Biologicum, Martin Luther University Halle-Wittenberg, Weinbergweg 10, 06099 Halle (Saale), Germany
[2] College of Education, The University of Arizona. P.O. Box 210069, Tucson, AZ 85721, USA; brucej@email.arizona.edu
[3] Department of Environmental Science and Engineering, Kathmandu University, P.O. Box 6250, Dhulikhel 45200, Nepal; bedmani@ku.edu.np
* Correspondence: shakil.regmi@geo.uni-halle.de

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Abstract: The Two-dimensional Model of Ecological Values (2-MEV), developed and verified in Western Europe, successfully explores the environmental values and attitudes of the children (11−16 years old) using questionnaires/items. However, the reliability of the 2-MEV Scale and its bi-dimensionality in a non-industrialised country, such as Nepal, is unexplored. Nepal lies within the monsoon region, which triggers extreme environmental crises such as floods. As environmental values and attitudes are related to pro-environmental/adaptive behaviour, this study analyses not only the values and attitudes of children but also the validity of the 2-MEV Scale in a different geographic and socioeconomic setting. Therefore, the items of the 2-MEV Scale were modified, translated, and validated in two rounds with 200 and 201 children. Results were examined using principal component analysis and confirmatory factor analysis, respectively. The findings validated the two constructs of environmental values (Preservation and Utilisation) with a correlation of −0.93, but the attitude's pattern varied from that found in industrialised countries. Finally, the rural Nepalese version of the 2-MEV was used to measure environmental values. Most children (78.62% from $n = 379$) show an inclination towards Preservation, 0.26% towards Utilisation, 20.05% towards both values partially, and 1.05% were neutral. In general, the children held pro-environmental values and attitudes.

Keywords: environmental attitude; environmental values; 2-MEV model; rural Nepal

1. Introduction

Extreme precipitation and river runoff events, which are common in the southern slopes of the Himalayas, are known to trigger landslides and floods [1,2]. For example, an extreme precipitation event occurred in the mid-hills and plains of Nepal in August 2017 in which 461,000 people were temporarily displaced, while 143 lost their lives [3]. These extreme events suggest that Nepal is highly susceptible to water-related disasters [4–7]. Consequently, the vulnerability of people, especially children and adults living near river banks, is high [4,8]. Adaptation to the environmental crisis is crucial for the livelihood of the vulnerable community living near the river banks of Nepal.

In addition to natural disasters, environmental degradation and pollutions are part of the environmental problems in Nepal [9]. In order to address, adapt to, and tackle such environmental crises and problems, the government of Nepal focuses on education as one of the primary tools [10].

However, the education content has been criticised for being uniform for all parts of Nepal [11,12]. Although limited in number, the literature shows that this uniformity has led children to identify common urban environmental problems but not their local issues in rural Nepal [13]. In addition, the role of environmental values and attitudes in environment education leading to adaptive and pro-environmental behaviour in Nepal is unexplored [11,12].

Knowledge and understanding are the acknowledged cognitive component of environmental values and attitudes [14–17]. Consequently, environmental education affects environmental values and attitudes [18–21]. Various studies report that environmental values and attitudes positively influence adaptive and pro-environmental behaviour [22–28]. However, the relationship between environmental values and attitudes with pro-environmental behaviour is not a universally accepted fact. The strength of this relationship ranges from low to moderate [29–31].

Hines et al. [17] in their meta-analysis analysed and synthesised the identified variables in various environmental psychology studies (n = 128) from 1971 to 1987. They report attitude as a psychosocial variable of pro-environmental behaviour. Furthermore, they conclude that attitude is the third most crucial variable of behaviour (r = 0.35) compared to verbal commitment (r = 0.49). Furthermore, Bamberg and Möser [31] extend the meta-analysis of Hines et al. by focusing on environmental psychology studies from 1995 to 2006 (n = 46) and conclude that pro-environmental behaviour is a mixture of self-interest and pro-social motives. Likewise, they report a complex arrangement of self-interest and pro-social factors (problem awareness, internal attribution, social norm, feelings of guilt, perceived behavioural control, attitude, moral norm, and intention) responsible for predicting pro-environmental behaviour. Similarly, Meinhold and Malkus [23] and Johnson and Činčera [25] report that pro-environmental values and attitudes, moderated by environmental knowledge, can effectively predict pro-environmental behaviour.

Furthermore, Kaiser et al. [30] reports on key constructs that predict ecological behaviour, environmental knowledge (factual knowledge), environmental values (normative knowledge), environmental behaviour intention, and responsibility feelings. Likewise, after a review of 109 studies, Ajzen and Fishbein [18] find that the closer the target, action and reference components are, the more likely it is that attitude will predict behaviour. Moreover, Kibbe et al. [21] report a positive attitude of the population towards nature influencing their pro-environmental behaviour. Similarly, Milfont and Duckitt [32] refer to various contemporary environmental perception theorists observing environmental behaviour interacting with environmental attitude.

These studies explore attitude as a one-dimensional construct, while a new theoretical construct of a multi-dimensional view of environmental attitude has emerged [33]. Blaikie [33] uses established item scales, and factor analysed them to come up with seven first-order factors that represent general ecological viewpoints. Based on this development, Bogner and colleagues in the late 90s and early 2000s extended the concept of a multi-dimensional view of environmental attitude [19,34,35]. Their investigation with Western European students (11–16 years old) led to the development of the Two-dimensional Model of Ecological Values (2-MEV). The 2-MEV has two higher-order orthogonal factors (values), Preservation and Utilisation, based on biocentric and anthropocentric worldviews, respectively. The higher-order factors include the sets of primary factors (attitudes). The attitudes are considered traits, while values are considered as types of traits [35]. Furthermore, the two higher-order values of Preservation and Utilisation were negatively correlated. Likewise, the orthogonal relationship between these two values means that a person can hold both values; this was different from earlier constructs of environmental attitude. Although Bogner and colleagues cross-validated the construct of environmental values proposed by 2-MEV [36], Milfont and Duckitt [37] questioned:

- The theoretical construct of two orthogonal dimensions based on the reported significant correlation;
- Five primary factors under two higher-order factors suggesting unbalanced attitudinal subscales;
- The biased trait of items under primary factors including discriminant validity of higher-order factors;

- Using eight primary factors to come up with two higher-order factors and later limiting to five primary factors in the proposed model; and
- Using a less adequate statistical test.

However, Milfont and Duckitt [37] successfully conducted an analysis and theoretical discussion to validate the two-dimensional construct of environmental values, thus strengthening the new construct of environmental values [36].

The development and validation of the two-dimensions gave environmental values a strong base to consider multiple viewpoints of behaviour [38–40]. However, these studies were conducted in developed and industrialised countries. Milfont and Duckitt [37] point out that the bi-dimensionality of environmental attitude might not be as distinct in developing countries as observed because the macrosocial and macro-economic variables can influence the psychological constructs. They refer to Corral-Verdugo and Armendáriz's [41] findings of high covariance between the pro-human exception and the pro-environmental exception in Mexico. Based on their finding, Corral-Verdugo and Armendáriz argue that there is a dualism in the belief of industrialised countries, while it can be plausible to hold both pro-human and pro-environmental values in non-industrialised countries. Along with Milfont and Duckitt in New Zealand, Johnson and Manoli [42] in the USA, and Boeve-de Pauw and Van Petegem [39] in Belgium also individually validated the new construct of environmental values proposed by the 2-MEV model. After a longitudinal (8 years) validation of the 2-MEV in the USA, the multi-dimensional construct of environmental values is well-founded [36].

These findings suggest that the 2-MEV Scale can be a standard tool to analyse environmental values and attitudes, but local factors should be considered before using it [43]. Nepal is a least-developed country within which environmental attitudes and values have been little studied. Thus, analysing the environmental values of Nepalese children using the localised and validated 2-MEV Scale is essential to understanding the variation of the construct of environmental values and attitudes in a part of the world with different social, economic and environmental structures. Moreover, understanding the environmental values of the children of rural Nepal will help to determine how education might proceed regarding environmental concerns.

2. Site Selection and Methodology

2.1. Study Site

Chakraghatti village, situated in the south-eastern plains (*Terai*) of Nepal in *Sunsari* district, is the selected study site for the analysis of the environmental values of the local school-going children. Chakraghatti is located at 26°44′47.6″ N 87°08′01.4″ E and lies in the eastern bank of the Koshi River. The primary source of livelihood in the study site is agriculture. Based on the national census of 2011, 54.4% from the total population of 23,631 are female [44], and 15,970 (from which 50.7% are male) people above five years of age have completed some form of school education by 2011 [45]. A high aggradation of river sediments occurs in the *terai* region, forming alluvial flood plains, which often leads to flooding in the region [46]. In addition to flooding caused by the lateral movement of the river, high water discharge also has a long history of flooding in the region [47].

The recent and most disastrous flood in Chakraghatti was in 1984. During this event, the Koshi River flowing in the western part of its alluvial fan started to divert towards the east, which led to the destruction of more than 2200 households [48–50]. Numerous other flooding events occur in this area and are a common phenomenon observed by local inhabitants [48–51]. After the change of the Koshi River's path in 1984, it is again moving westward [49,51,52]. The sediment brought by the river tends to support different crops [53]. Hence, it has started to attract people to start farming and live nearby the riverbed with an ever-increasing risk of flood.

The 66,000 hectares land in and nearby the study site have largely benefitted from the Koshi barrage irrigation system [52]. Likewise, the community depends on forest fodder for their livestock and forest products such as firewood and thatched grass for their livelihood [54]. However, agricultural expansion is increasing and is creating a threat to the nearby natural forest area. The study site is located north from the Koshi Tappu Wildlife Reserve, which is home to Nepal's only

water buffalo (*Bubalus bubalis*) population and is a popular destination for migratory birds with Ramsar-listed extensive wetland areas [54]. Furthermore, the community's agricultural farms are continuously under threat from wandering wildlife, especially from water buffaloes. In order to preserve these natural forests, wetlands and wildlife, the reserve has stipulated spatial and temporal restrictions to the local people who historically had free access to the natural resources [54]. The dependency on natural resources for the local livelihood and the need to preserve it in the study site indicates a conflict between the people and available resources. Heinen [54] finds a negative attitude of the people (adults) living in the eastern (within 3.5 km) and western (within 1.5 km) side of the reserve's boundary towards the reserve. Moreover, the issues of loss of forest and biodiversity, soil erosion, air and water pollution, and waste management issues are increasing in Nepal [9] and is also a major environmental concern in the study site.

With extreme conditions and the high risk of floods, along with conflict between the usage and preservation of natural resources and increasing environmental pollution concerns, the role of adaptive and pro-environmental behaviour, and environmental values becomes crucial in this region. All these reasons make Chakraghatti an appropriate place to explore children's environmental values as they are the most vulnerable group in this environment.

2.2. A Tool to Analyse Environmental Values: the 2-MEV Scale

A common problem with environmental values and attitude studies was the lack of standard, psychometrically sound measurement tools [55,56]. Most studies developed instruments specific for their study but not a general measure of environmental values or attitudes [42]. To address this issue, Bogner and Wilhelm [55] developed the Environmental Perception Scale in 1996, leading to the identification of two dimensions, 'preservation' and 'utilisation', and the Two-Dimensional Model of Ecological Values (2-MEV) [34,57,58].

Bogner and Wilhelm, in 1996, gathered and integrated as many items as possible from earlier studies in their analysis. They used factor analysis to analyse the items. A principal component analysis was used to sort the items into values and attitude factors [36]. The items fell into two higher-order dimensions (values), which had different factors (attitudes) under them. Across several studies, the items were updated and validated by Bogner and colleagues to reach a reliable stage [36,43]. Based on the response of sample populations of children between 11 and 16 years old, the first scale describing environmental attitudes and their contribution to environmental values was published [34,57,58].

The items were subsequently modified and then adjusted and tested for use in other parts of the world, including New Zealand, Mexico, and the United States. In some cases, the scale was translated into other languages, with careful attention given to its transferability into other languages without losing its validity as well as reliability [43]. The two orthogonal higher-order values which encapsulated a set of the attitudes, namely Preservation (P), a biocentric dimension, and Utilisation (U), an anthropocentric dimension, emerged from Bogner and colleague's studies. The 2-MEV Scale is especially designed to understand the environmental values and attitudes of children 11–16 years of age [43].

In 2003, Wiseman and Bogner [35] report the P and U were uncorrelated, meaning that a person could have a preservation value of the environment and at the same time can have a utilisation value to make use of natural resources too. In most studies using the 2-MEV Scale, the P value consists of three attitudes, Intent of Support, Care with Resources, and Enjoyment of Nature, while the U value consists of two attitudes, Altering Nature and Human Dominance. Each attitude has 3–4 items, and each item has a 5-point Likert-type response scale ranging from 1 (strongly disagree) to 5 (strongly agree).

2.3. The 2-MEV Scale for Rural Nepal

A version of 2-MEV Scale for non-industrialised countries and, more specifically, for Nepal, was not available. The first step was thus to create a validated version of the 2-MEV Scale for the study site, which is in the rural part of Eastern Nepal.

The 2-MEV Scale is a set of items that reflect cognitive, affective, enactive and behavioural values with a focus on the action, target, context and phase of the respondents [18,55]. Traditionally, the 2-MEV Scale uses a Likert-type response scale. After discussing the survey method with teachers and children in the study site, the children did not prefer the Likert-type scale. Thus, a worded rating scale which represented the Likert-type scale was used, as recommended by Powell [59].

Very satisfied	(5)
Somewhat satisfied	(4)
Neither satisfied nor dissatisfied	(3)
Somewhat dissatisfied	(2)
Very dissatisfied	(1)
Do not know/No opinion	(6)

To address the local context of rural Nepal, previously used items from other studies were modified along with the development of new items. As suggested by Bogner and Wilhelm [55], great attention was paid to the item relevance of the children's world by addressing actions that are relevant to them. The items reflect ideas they encounter and are concrete rather than abstract. Items with multiple actions or that might only affect others were avoided.

The second step was translating the items to the Nepali language, which is written in the *Devanagari* script. According to Steiner [60], translation is a transfer of meaning between languages. Thus, a literal translation of words was not enough in this study to create a valid instrument, and there is also no such thing as a correct translation. Temple and Young [61] suggest that the translator always makes his or her mark on the study, whether it is acknowledged or not. Birbili [62] points out that the linguistic competence of the translators' knowledge of the people under study and the circumstances in which the translation takes place are important factors for any valid study. For example, there was a conflict between the words 'nature' and 'environment' during the translation. In the Nepalese context, the usage of the words nature and environment can have different meanings in specific situations. Thus, translating the modified item 13, *I prefer a natural setting more than the urban setting* to the Nepali language became *I prefer the environment of a village compared to that of a city*. This translation includes not only the aspect of translation but also the cultural aspect. The term 'natural setting' is unclear, and villages are natural rather than urban areas; thus, it was easy for the respondents to understand this translation rather than using the terms 'natural setting' and 'urban setting'.

The conventional procedure of translation, as followed by Schneller et al. [43], was used. The process included translation and back-translation of the items by native Nepali speakers with recommendations from experts. The experts had scientific backgrounds and knowledge about the study site, environmental issues, and survey battery tools. Finally, the items were taken to the study site, where the language, dialect and regional words were discussed with local teachers and children. No flaws were detected by the teachers and children in the set of items. The items were then piloted for the validation of the items, using principal component analysis and confirmatory factor analysis methods. Finally, the validated version of the 2-MEV model was used for the environmental values and attitudes survey of the children.

3. Validation of the 2-MEV for Rural Nepal

3.1. Development of the Items

Two methods were used to develop the items. First, the items from the previous 2-MEV studies were modified, when necessary, to fit into the local environmental, social and cultural context of the research site. Table 1 presents the details of the items used from previous 2-MEV Scale studies. Second, entirely new items were written based on the local context of the study site.

Table 1. List of the items adopted/modified from the previous Two-dimensional Model of Ecological Values (2-MEV) study.

Item Number	Original Item	Modified Item	Source
1	If someday I have free time, I would like to volunteer to help protect the environment.	*Same as original.*	[43]
4	I would like to join and actively participate in an environmentalist group.	I would like to volunteer with an organisation that is working to protect the environment in my community.	[32,37]
5	I try to tell others that nature is important.	*Same as original.*	[42,43,56]
9	There should be special nature reserves into which nobody be allowed to enter.	I support conservation of forest for wildlife protection.	[55]
10	We must set aside areas to protect endangered species.	If necessary, land near my community should be separated to support endangered plants and animals.	[58]
12	I would like to sit by a pond and watch dragonflies.	I enjoy sitting under a tree to enjoy its shade.	[34,37,42,56,58]
13	I enjoy trips to the countryside.	I prefer the environment of a village compared to that of a city.	[58]
14	I like to go on trips to places like forests away from cities.	Walking through the forest and/or in the mountains brings me joy.	[32,34,37,42,43,56]
15	I like the quiet of nature.	I enjoy sitting beside a river.	[32,34,37,42,56]
16	I especially love the soft rustling of leaves when the wind blows through the treetops.	I enjoy hearing the soft rustling of leaves when the wind blows through the trees.	[34,37]
18	People have the right to change the environment (nature).	People have the right to change the environment (nature), e.g., clearing forest, plotting land or draining stream	[42,43,56,58]
19	Human beings were created or evolved to dominate the rest of nature. And, Humans have the right to change nature as they see fit.	People should be allowed to change the environment for their benefit without considering its effect on the environment.	[32,37,58]
20	To feed people, nature must be cleared to grow food.	To feed people, forests must be cleared for agriculture to grow food.	[42,43,55,56]
21	I like a grass lawn more than a place where flowers grow on their own.	*Same as original.*	[42,56]
22	Building new roads is so important that trees should be cut down.	*Same as original.*	[42,56]
24	Since mosquitos live in wetlands, it would be better to drain these areas for farming.	*Same as original.*	[42,56]
25	Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.	Instead of safeguarding the domesticated animals, it would be better to clear forests and displace wild animals that could attack the domesticated animals.	[32,37]
26	People are supposed to rule over nature.	*Same as original.*	[42,43,56]

27	Human beings are more important than other creatures.	Since human beings are more intelligent, they have the greatest right to live.	[58]

Out of these nineteen original 2-MEV Scale items, six items did not need any modification, while the remaining thirteen items were modified to suit the rural Nepalese context. Primary factors considered during the modification process of the items were the context of the item regarding the lifestyle of the community members and communication with the local teachers. However, while modifying the items, it is essential to keep the same intent [63], and special attention was given in this process to maintain the intent of the item.

An example of the item modification due to its context is item 10. The original version of item 10 focuses on setting aside an area for the protection of endangered species. However, setting aside an area is a vague description for the children, as it does not define which area, thus leading to confusion. Hence, "setting aside an area" was modified to "a land near my community" to improve the item's connectedness with the children. Similarly, *I like to go on trips to places like forests away from cities* (item 14) was modified to *Walking through the forest or/and in the mountains brings me joy*. Going on trips is not an everyday activity in rural Nepal. However, forests and mountains are part of rural Nepal and strolling in forests and mountains is a common activity for school children. Likewise, in item 20, the word "nature" is modified to "forest" to be more precise about the content of the item. The items were modified to make them simple, contextual and understandable for the children.

These sets of available items did not represent the rural Nepalese context fully. Thus, eight items were developed that addressed similar ideas in previous 2-MEV studies. These eight items were written based on observations of the physical environment and lifestyle as well as by consultation with local teachers of the study site and related experts. Table 2 presents a list of newly developed items for this study.

Table 2. List of newly developed items for this study.

Item Number	Newly Developed Items
2	I would like to participate in an afforestation campaign.
3	I would like to participate in a cleaning campaign.
6	After cutting one tree, I try to re-plant a new one.
7	I avoid dumping my waste into rivers.
8	I avoid burning my plastic waste.
11	To avoid water pollution, I do not use soap while bathing in the river.
17	I enjoy the natural sound of the flowing river.
23	To protect vulnerable riverside communities from flooding, rivers should be diverted.

The observation of activities of the local, school-going children in physical environments at the study site was performed by the corresponding and third author during the first site visit in June 2016. We visited significant areas for livelihood management of the study site (details in Section 2.1), and they were the nearby Koshi river, nearby forests, irrigation canals directed from the river, and agricultural farms. The observations were photographed and concluded with a field note based on the discussion with the present children about how they enjoy, utilise and protect the environment around them. From these materials, items 7, 11, and 17 were written.

The permanently residing school teachers in the study site are primary observers of local socio-economic and environmental contexts as well as educational content and intentions/conducts of the school-going children. Three teachers from two different schools of the research site were consulted regarding the development of items using an open-question group discussion methodology. The teachers were from the health, population and environment, science, and social studies subjects. Based on the discussion with teachers on the contents of education, extra-curricular activities, and general conducts of the children while taking in regard the major natural environment and related environmental problems of the study site, items 2, 3, 6, and 8 were written.

Likewise, a similar method was used with two academic researchers from Nepal (experts) who have experience in conducting environment-related battery surveys in different parts of Nepal. This discussion yielded similar insights as to the items mentioned above, with an addition of item 23. The intent behind item 23 is crucial in flood-dominated regions of Nepal because the study site, being vulnerable to catastrophic floods, has used river damming to control the water flow. Furthermore, the five from the above mentioned seven items are related to the river or with the forest. The livelihood in rural Nepal depends to a large extent on the forest or the river, as elaborated in Section 2.1 [54], and the issues of cleanliness and waste management are one of the most significant sources of pollution in Nepal [9]. Thus, it is essential to explore these items to understand the children's intent towards their environment, within the context of 2-MEV model. While developing these new items, special care was given to considering the intent of the children about their environment.

3.2. First Validation Survey

The first survey aimed to analyse the efficiency of the 27 items to explore the environmental values and attitudes of the children and was conducted in June 2016. The children's capacity to understand the items was analysed by adding "I did not understand the question" option in the survey as well as by asking them to underline any confusing words/sentences in the questionnaire. Principal component analysis (PCA) was used to analyse factor loadings. PCA reduces a set of correlated items into a smaller set of independent composite variables, labelled as components [64,65]. The PCA was conducted using IBM SPSS 24 software. Most of 2-MEV Scale studies have used PCA to obtain components [19,34,57,66,67]. Yong and Pearce [65] suggest a rotation of the components for the better interpretation of the items. The main aim to iterate is to attempt to load an item on as few components as possible while maximising the number of high loadings in each variable [68]. There are two types of rotation method: orthogonal and oblique. The orthogonal rotation method is used for uncorrelated items while the oblique is for correlated items. Based on the features of the items used in this study, an oblique rotation method, namely Promax with Kappa 4, was used to interpret the components from the first survey. The Promax method is known for its speed in larger datasets and it obtains a simple structure by increasing the correlation between the items [69].

Two hundred children, randomly selected from the two schools of the study site, participated in this survey, out of which 58.2% were female. The survey was conducted with children from Grades 8 to 10, with an average age of 14.76 (standard deviation: 1.36) and ranging from 12 to 19 years. In the study site, there are twelve schools, but only five provide classes above the eighth grade. The two schools, nearby the village's centre with proximity from the forest/agriculture area and the river, were selected for the validation study of the items. Likewise, the teachers with whom the development of the items was discussed were also from the same two schools, and they facilitated official approvals from their schools. Only those children living in the study site and who had free time as well as were interested during the day of the survey were selected. The participating children were briefed orally and in writing about the study project, then they ensured their consent for the survey, including their anonymity. All but one of the 200 children completed the survey. There is no clear rule of thumb about how many respondents are needed for a PCA. However, suggestions state 3–20 respondents per item [42]. In the present study, the were 7.4 respondents per item. During the analysis, the responses with the value 6 ("I did not understand the question") were omitted and left as blank to negate their impact on the analysis.

The suitability of the dataset to conduct PCA was verified by using the recommendations of Young and Pearce [65], who recommend that the determinant score of the items correlation matrix to be more than 0.00001 to ensure the absence of multicollinearity. In this survey, the determinant score was 0.001. Likewise, Bartlett's Test of Sphericity had a significant level of 0.0 against the recommended value of less than 0.05. Similarly, Kaiser Meyer Olkin Measure (KMO) was 0.626 (recommended value is above 0.5). These observations determined that the survey result was adequate to conduct a PCA with Promax rotation. There are different ways to determine a suitable

number of components. However, the items which were used in this survey demonstrated two distinct components in their original 2-MEV Scale studies [32,34,37,42,43,56].

According to previous studies, items 1–17 and 18–27 used in this study represent Preservation and Utilisation values, respectively. A constrained PCA was used in the present study to see whether the items having the same traits as those used in the previous study demonstrate a similar pattern or not. The results of the present PCA with two components explained 24.64% of the total variance. Table 3 presents the loading values of the two components. The PCA was conducted with a cut-off value of 0.32, meaning any item with loading below ±0.32 was not displayed and was disregarded for the second round of the survey. There is no rule to use a precise cut-off value, but most studies use values between 0.3 and 0.4 [42,56].

Table 3. Two component's loading score of the first survey result.

Item Number	Component	
	Preservation	**Utilisation**
13	0.664	
9	0.650	
14	0.633	
17	0.595	
12	0.550	
3	0.530	
16	0.517	
5	0.515	
27	–0.476	
1	0.461	
2	0.458	
15	0.449	
22	–0.430	
10	0.427	
6	0.378	
4	0.323	
25		
21		
19		0.668
11		–0.621
20		0.554
7		–0.415
23		0.397
8		–0.378
24		–0.346
18		
26		

Extraction method: principal component analysis (PCA). Rotation method: Promax with Kaiser Normalisation.

The PCA result demonstrated the pattern of two components was identical to previous 2-MEV studies, justifying the usage of the adopted and developed items. However, items 18, 21, 25 and 26 had loading values below the cut-off of 0.32 and were removed from the set of items for the second survey. Two issues emerged. First, three items meant for the value of Preservation (7, 8 and 11) loaded under Utilisation, while two items meant for the value of Utilisation (22 and 27) loaded under Preservation. In all of these cases, the items that loaded under opposite values had negative loadings, further justifying the use of two components for the PCA. Second, item 24, meant for the values of Utilisation, had a negative loading under the Utilisation component. The negative loading demonstrates that it has precisely opposite characteristics compared to Utilisation, i.e., Preservation. This was likely due to the social norm of the study site to kill mosquitoes as mosquito-related diseases are common threats in the area. Thus, instead of modifying item 24 to represent the Preservation value, it was also disregarded from the set of items for the second survey.

Finally, based on the negative loadings, five items were modified. Items 7, 8 and 11 were modified to represent Utilisation while items 22 and 27 were modified to represent Preservation for the second survey. For example, item 8, *I avoid burning my plastic waste* was modified to *Waste consisting of plastic materials should be burned*. The children responded with an average mean value of 2.24 (higher than 3 is Preservation) resulting in a negative loading in the Utilisation component, thus suggesting modification of the item. Moreover, burning plastic and throwing waste into a river is also a common activity in Nepal as well as in the study site. Interestingly, farming by removing forest in item 20, Utilisation loaded under that component as expected, but item 22, about roads against forests, loaded under Preservation. These are indicative of the agriculture-dominated society of rural Nepal.

Furthermore, the feedback given by the children were also considered to modify the items. The main difficulties in the children's understanding were the complexity (items 4, 10 and 19) and unfamiliar terms/words (items 11, 16, 23 and 24) in some of the items. These issues were addressed by modifying items 11 and 19. However, these modifications can only be noticed in the Nepali version. Items 4, 10, 16 and 23 were left as it was because of the lack of alternative words. Therefore, to remove any probable confusions, the intent of these items was thoroughly explained to the children before conducting the second round of the survey. Finally, a new set of items was obtained, as seen in Table 4.

Table 4. The final set of items for the second round of survey categorised according to two values, Preservation and Utilisation, after two-component PCA and children's feedback.

Item Number	Preservation Items
1.	If someday I have free time, I would like to volunteer to help protect the environment.
2.	I would like to participate in an afforestation campaign.
3.	I would like to participate in a cleaning campaign.
4.	I would like to volunteer with an organisation that is working to protect the environment in my community.
5.	I try to tell others that nature is important.
6.	After cutting one tree, I try to re-plant a new one.
9.	I support conservation of forest for wildlife protection.
10.	If necessary, land near my community should be separated to support endangered plants and animals.
12.	I enjoy sitting under a tree to enjoy its shade.
13.	I prefer the environment of a village compared to that of a city.
14.	Walking through the forest and/or in the mountains brings me joy.
15.	I enjoy sitting beside a river.
16.	I enjoy hearing the soft rustling of leaves when the wind blows through the trees.
17.	I enjoy the natural sound of the flowing river.
22.	Forests should not be cut down to build roads.
27.	Human beings should coexist with other creatures.
Item Number	**Utilisation Items**
7.	Waste should be thrown away in the river or streams.
8.	Waste consisting of plastic materials should be burned.
11.	Soap should be used while bathing in the river.
19.	People should be allowed to change the environment for their benefit without considering its effect on the environment.
20.	Forests must be cleared for agriculture.
23.	To protect vulnerable riverside communities from flooding, rivers should be diverted.

3.3. Second Validation Survey

The participants of the second survey included little more than half of the children from the first survey as well as additional children from the same two schools from the study site. The survey was

conducted in November 2016, with 201 randomly selected children from grades 8 to 10. The random selection of the children was made by using the same methodology as the first survey (see Section 3.2). The average age of the children was 15 (standard deviation: 1.4) and ranged from 12 to 20 years; 64% were female. The aim of this second survey was to find a modified 2-MEV Scale, consisting of 22 items, for rural Nepal. The second survey consisted of 22 modified items.

The second survey results were analysed using confirmatory factor analysis (CFA), which is based on indices of the goodness of fit [37,65]. The CFA was conducted using IBM SPSS's AMOS 21 package. The CFA models the relationship between observed indicators and underlying latent variables [70]. CFA evaluates how the set of items form a reliable model based on the observed data. However, CFA requires a theory or hypothesis which is tested by path coefficients between the factors [71]. Thus, every aspect of the model to be evaluated needs to be explicitly specified.

As described earlier, the 2-MEV consists of five attitudes, which are under the two values. The items to be tested for two values were already obtained through PCA. Likewise, the items to be tested for attitudes was hypothesised based on the attitudinal characteristics of adopted items from the previous 2-MEV studies and the related context of the newly developed items. Based on this hypothetical stand, two sets of hypotheses to be tested were finalised, as presented in Table 5.

Table 5. The developed hypothesis of the items to be tested using Confirmatory Factor Analysis (CFA) under different attitudes and values.

Hypothesis 1	Hypothesis 2
Preservation	*Preservation*
• Attitude 1	• Attitude 1
Items to be tested: 1, 2, 3, 4 and 5.	Items to be tested: 1, 2, 3, 4 and 5.
• Attitude 2	• Attitude 2
Items to be tested: 6, 9, 10, 22 and 27.	Items to be tested: 6, 9, 10, 22 and 27.
• Attitude 3	• Attitude 3
Items to be tested: 12, 13, 14, 15, 16 and 17.	Items to be tested: 12, 13, 14, 15, 16 and 17.
Utilisation	*Utilisation*
• Attitude 4	• Attitude 4
Items to be tested: 7, 8 and 11.	Items to be tested: 7, 8, 11 and 23.
• Attitude 5	• Attitude 5
Items to be tested: 19, 20 and 23.	Items to be tested: 19 and 20.

The CFA was carried out by using maximum likelihood estimation, which produced minimization history, standardized estimates, residual moments and modification indices with a threshold value of 4. During the analysis, the responses with the value 6 ("I did not understand the question") were omitted and left as blank to negate their impact on the item's correlation with its factor values. CFA Models 1 and 2 developed from hypothesis scenarios 1 and 2, respectively, were tested by using the goodness of fit indices as suggested by Johnson and Manoli [56] and Kibbe et al. [21]. Table 6 presents the goodness of fit of the models.

Table 6. The goodness of fit value of the models as compared with the recommended values.

The Goodness of Fit Indices	Recommended Value	Model 1	Model 2	Model 3	Model 4
Chi-square(x^2)/df	<2.0	2.36	1.697	1.14	1.12
GFI	>0.90	0.845	0.876	0.942	0.943
AGFI	>0.90	0.808	0.846	0.918	0.919
CFI	>0.90	0.465	0.728	0.940	0.949
TLI	>0.90	0.394	0.691	0.925	0.937
SRMR	<0.08	0.144	0.0698	0.053	0.052
RMSEA	<0.05	0.083	0.059	0.027	0.025

As observed in Table 6, both the hypothesised models failed to provide a fitting solution. To find a better-fitting model, various options of different groups of items were analysed in the next rounds. However, no items were moved from their hypothesised attitude to another. As a result, two new

models with fewer items were achieved. The two new models were named as Model 3 and 4. Model 3 and 4 had items 2, 4 and 5 under attitude 1, items 10, 22 and 27 under attitude 2, and items 13, 15 and 17 under attitude 3. Likewise, Model 3 had items 7, 8 and 11 under attitude 4, and items 19, 20 and 23 under attitude 5. In contrast, Model 4 had items 7, 8, 11 and 23 under attitude 4, and items 19 and 20 under attitude 5.

As seen in Table 6, Model 3 and 4 showed improvement to provide a better-fitting solution compared to that of Model 1 and 2. Comparatively, the difference between the goodness of fit values between Models 3 and 4 was negligible. However, Model 3 had three items per attitude, and each item under its attitude had a common theme, unlike the items under attitude 4 of Model 4. Thus, Model 3 was selected as the final model of 2-MEV Scale for rural Nepal. Finally, based on the confirmed model, the attitudes were named according to the theme of the accepted items under them. Table 7 presents the list of accepted items along with their attitudes and values.

Table 7. The validated set of 2-MEV items for rural Nepal and their attitudes and values.

Preservation
Intent of Support
2. I would like to participate in an afforestation campaign.
4. I would like to volunteer with an organisation that is working to protect the environment in my community.
5. I try to tell others that nature is important.
Protection of Nature
10. If necessary, land near my community should be separated to support endangered plants and animals.
22. Forests should not be cut down to build roads.
27. Human beings should coexist with other creatures.
Enjoyment of Nature
13. I prefer the environment of a village compared to that of a city.
15. I enjoy sitting beside a river.
17. I enjoy the natural sound of the flowing river.
Utilisation
Polluting Nature
7. Waste should be thrown away in the river or streams
8. Waste consisting of plastic materials should be burned.
11. Soap should be used while bathing in the river.
Altering Nature
19. People should be allowed to change the environment for their benefit without considering its effect on the environment.
20. Forests must be cleared for agriculture.
23. To protect vulnerable riverside communities from flooding, rivers should be diverted.

Items 4 and 5 were adopted from the attitude intent of support from the previous 2-MEV studies, while item 2 also represents intent to support environmental development activity. Thus, attitude 1 was named Intent of Support. Likewise, item 10 and 22 from attitude 2 demonstrate a willingness to protect nature, while item 27 represents the human–nature relationship for the protection of nature. Since all three items share a common theme of protection of nature, attitude 2 was named Protection of Nature. Similarly, item 13 and 15 were adopted from the attitude of enjoyment of nature from the previous 2-MEV studies, and item 17 also demonstrates enjoyment towards a natural setting. Thus, attitude 3 was named Enjoyment of Nature.

All three items (7, 8 and 11) under attitude 4 were developed for this study. These three items share a common trait of polluting nature. Thus, attitude 4 was named Polluting Nature. The intent of these items demonstrates pollution related to the utilisation of natural resources, for example, bathing in the river with a soap. Similarly, items 19 and 20 were adopted from the attitude Altering Nature from the previous 2-MEV studies. Likewise, item 23 also focuses on altering the course of nature. Thus, attitude 5 was named Altering Nature. Finally, the PCA and CFA validation process resulted in a two-dimensional model of 2-MEV for rural Nepal. The existence of both dimensions,

Preservation and Utilisation, in the 2-MEV Scale is its most significant advantage over other psychometric tools, as remarked by Boeve-de Pauw, Van Petegem and colleagues [38–40]. These two values are also in line with the current intergovernmental agenda of sustainable development goals [72]. Figure 1 presents the validated model of 2-MEV Scale for rural Nepal.

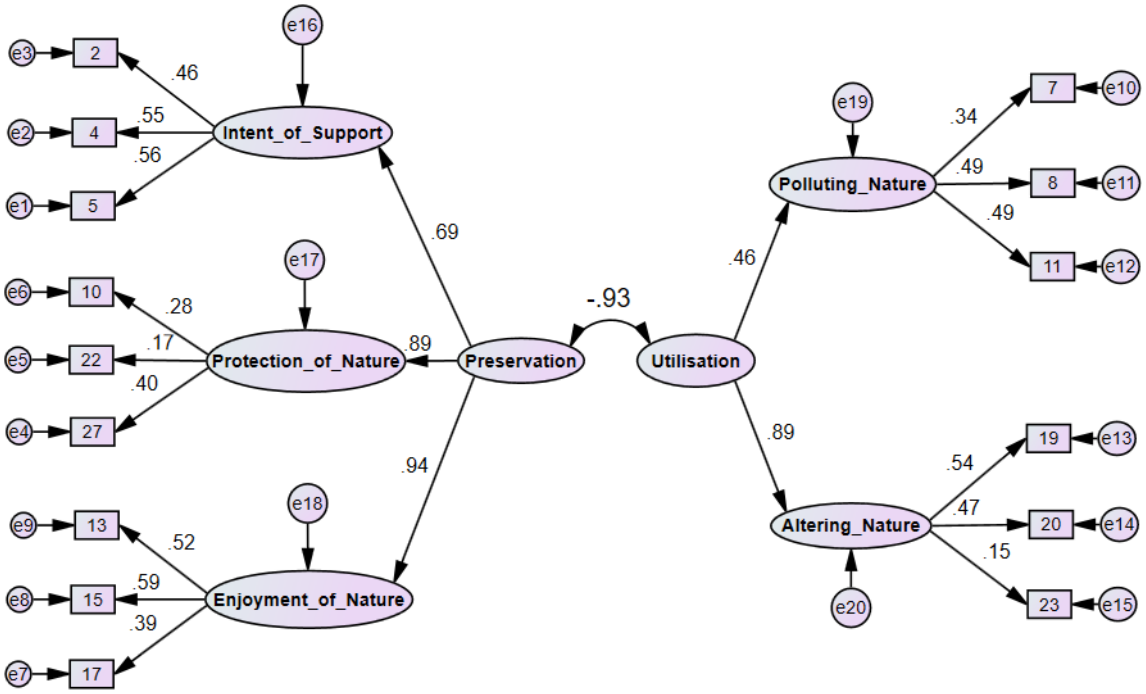

Figure 1. Validated model of 2-MEV for rural Nepal.

4. Sample Size of the Children for Final Survey

The validated 2-MEV Scale for rural Nepal was used to explore the environmental attitude of rural Nepalese children in the study site. Fifteen items using the 5-scale worded Likert-type responses as used in the first two surveys were used. The option of "I did not understand the question/Undecided" was also included to avoid creating any artificial intent of the children [55]. Out of the total responses, only 1.5% selected the "Undecided" option and were omitted from the final calculations. The 2-MEV Scale was developed for children between 11–16 years old [34]. Since this study is based on a school environment, children from Grades 8, 9 and 10 were involved in this survey.

There are five schools in the study site which conduct classes for Grades 8, 9 and 10. In these five schools, there were 1178 children in Grade 8, 9 and 10 out of which 379 were surveyed for this study in April 2017. The sample population was calculated by following the Arkin and Colton's [73] sample size formula. The surveyed children were selected using the methodology as elaborated in Section 3.2 and out of the 379, less than 40% of children were from the first two surveys. In Nepal, children of Grades 8, 9 and 10 are usually 12, 13 and 14 years old, respectively. However, the sample population had an average age of 14.37 (standard deviation: 1.32) and ranged from 12 to 18 years.

$$n = \frac{NZ^2 * p * (1-p)}{Nd^2 + Z^2 * p(1-p)} \quad (1)$$

where:
n = required sample size;
N = total number of children;
Z = confidence level (at 95% level Z = 1.96);
p = estimated population proportion (0.5, this maximizes the sample size);
d = error limit of 4.15% (0.0415).

There is no standard set value of confidence level and error limit—however, anything above 95% and below 5% is considered a good statistical representation [74]. Table 8 presents the details of the sample population from Grades 8, 9 and 10 of the study site.

Table 8. The population of total and sample children from Grades 8, 9 and 10 of the study site.

Grade	Total Population			Sample Population		
	Male	Female	Total	Male	Female	Total
8	154	176	330	56	65	121
9	189	247	436	58	65	123
10	184	228	412	50	85	135
Total	527	651	1178	164	215	379

Out of the total population of Grades 8, 9 and 10, 55.2% were female. Likewise, out of the sample, 56.7% were female. This signifies the representativeness of the surveyed sample population against the total child population. Moreover, following Arkin and Colton's [73] sample size calculation, the surveyed sample population represents a 95% confidence level at the confidence interval of 4.15 against the total child population of the study site. All 379 children completed the survey.

5. Result

5.1. Analysis of the Environmental Values

For the final survey results, the focus was on analysing the values of the children rather than the specific attitudes. On a scale of 1 to 5, mean scores above 3 in preservation indicates a pro-environmental value for Preservation, while mean scores below 3 indicate a pro-environmental value for Utilisation. As seen in Table 9, the majority of the sample population holds pro-environmental values with mean scores above 3 for Preservation and mean scores below 3 for Utilisation.

Table 9. Descriptive statistics of Preservation and Utilisation values.

Values	N Statistic	Minimum	Maximum	Mean		Standard Deviation
				Statistic	Std. Error	
Preservation	379	2.78	5.00	4.36	0.02	0.45
Utilisation	378	1.00	4.50	2.42	0.04	0.78

Further analyses looked at individual scores. Out of the total of 379 children, 298 (76%) were inclined towards pro-environmental values, i.e., with mean scores above 3 in the Preservation and mean scores below 3 in Utilisation. One child (<1%) was inclined towards anti-environmental values with a higher mean score (>3) in Utilisation and lower (<3) in Preservation. Four children (1%) were neutral with mean scores of 3 in both values. Finally, 76 children (20%) were inclined toward both values with mean scores above 3 in both Preservation and Utilisation. However, out of these 76 children, 61 had higher mean scores for Preservation than they did for Utilisation. A smaller group (13) have higher mean scores in Utilisation than they do in Preservation. Lastly, 2 children had equal Preservation and Utilisation mean scores.

Following Arkin and Colton's [73] sample size calculation formula, this result proves with 95% confidence that 78.63% ± 4.15% of the total population have pro-environmental values. Furthermore, environmental values based on the grade and gender of the sample population were also analysed. Table 10 presents the descriptive statistics of the environmental values of the sample population based on their grade.

Table 10. The environmental values of the sample population based on their grade.

Grade	Average Age	Preservation				Utilisation			
		N	Mean	Std. Error	Standard Deviation	N	Mean	Std. Error	Standard Deviation
8	13.5	121	4.19	0.04	0.49	121	2.76	0.07	0.76
9	14.3	123	4.45	0.04	0.41	123	2.35	0.07	0.74

10	15.2	135	4.44	0.04	0.42	134	2.20	0.06	0.71	

As seen in Table 10, Preservation values were higher and Utilisation values were lower in Grade 10 compared to 8. However, there was no remarkable difference or tendency in the values based on the age or gender of the children. Thus, it is not presented in this article, but the data is available in Mendeley Data, V1 [75]. Although age is associated with grade, the standard deviation of age in Grade 8, 9 and 10 is 1.22, 1.57 and 0.84, respectively, suggesting the spread of different ages in each grade.

5.2. Analysis of the Environmental Attitudes

The mean scores of the three Preservation attitudes (Intent of Support, Protection of Nature, and Enjoyment of Nature) were all above 3. The mean scores of the two Utilisation attitudes (Polluting Nature and Altering Nature) were below 3. As seen in Table 11, this indicates that the children have more intent to support, protect, and enjoy nature while having less intent to pollute and alter nature. However, the higher standard deviations for Polluting Nature and Altering Nature indicate more variation among the children.

Table 11. Descriptive statistics of five attitudes of the sample population.

Attitudes	N Statistic	Minimum	Maximum	Mean		Standard Deviation
				Statistic	Std. Error	
Intent of Support	379	2.33	5.00	4.74	0.02	0.45
Protection of Nature	379	1.67	5.00	3.79	0.04	0.80
Enjoyment of Nature	379	1.00	5.00	4.55	0.03	0.61
Polluting Nature	378	1.00	5.00	2.57	0.05	1.06
Altering Nature	378	1.00	5.00	2.29	0.05	0.9

Overall, 96 (25%) and 92 (24%) children show an inclination to pollute and alter nature, respectively, while only 2 (<1%) and 8 (2%) children do not incline toward supporting and enjoying nature, respectively. Likewise, 45 children (12%) are not inclined to protect nature. Out of the total 55 children whose mean score was below 3 in one or more of the three Preservation attitudes, none of them had a mean below 3 in all three attitudes. Similarly, out of the 96 and 92 children who were inclined towards polluting and altering nature, respectively, only 35 of them had a mean above 3 in both Utilisation attitudes. However, out of these 35 children, 21 have an average mean score above 3 on three Preservation attitudes, and only 12 have a mean score below 3 on three Preservation attitudes. Two children had the same mean scores for all five attitudes. As a summary, these children in rural Nepal had positive attitudes of supporting, protecting, enjoying, not polluting and not altering nature.

Additionally, the attitudes were also analysed based on the age, grade, and gender of the sample children. The attitudes show no tendencies based on age. Likewise, attitudinal preference based on gender was also minimal, with a maximum difference of only less than 0.19 in mean scores per attitude between female and male children. In contrast, as seen in Table 12, the mean statistic of five different attitudes show a noticeable increasing tendency of environmentally positive attitudes with increasing grade. The differences of the mean scores for Intent of Support, Protection of Nature, and Enjoyment of Nature between Grade 9 and 10 were not high, but they increased from Grade 8 to 9. However, as the grade increased, the mean value of the protection of nature also increasing. Similarly, with an increase in grade, the tendency to pollute and alter nature decreased.

Table 12. Mean statistics of five different attitudes based on the grade of the sample children.

Attitude	Grade 8			Grade 9			Grade 10		
	N	Mean	Std. Dev	N	Mean	Std. Dev	N	Mean	Std. Dev
Intent of Support	121	4.65	0.51	123	4.84	0.33	135	4.74	0.47
Protection of Nature	121	3.50	0.79	123	3.88	0.82	135	3.95	0.72
Enjoyment of Nature	121	4.42	0.71	123	4.61	0.56	135	4.62	0.54

Polluting Nature	121	2.71	0.98	123	2.25	0.98	134	2.10	0.78
Altering Nature	121	2.81	0.96	123	2.44	0.87	134	2.06	0.69

6. Discussion

The present analyses using principal component analysis and confirmatory factor analysis reveal alignment with the original findings of Bogner and Wiseman (1999). The two-dimensions of environmental values, Preservation (P) and Utilisation (U), prevails in Nepal as in other countries with five different attitudes under the two values. However, the nature of the attitudes is not entirely the same in this study compared to the ones used in previous 2-MEV Scale studies [34,42,43]. The major reason for the modification of attitudes is the modification and new development of the items.

In general, these children in rural Nepal had positive environmental values and attitudes. Johnson and Manoli [42] report a mean score of 3.62 and 2.52 of P and U, respectively in their pre-test sample in the United States Similarly, Schneller et al. [43] report a mean score of 4.22 for P and 2.45 for U, and 4.26 for P and 2.9 for U, for their two sample groups in Mexico. The pattern of these reported means is in line with the findings of this study.

Interestingly, the items under the attitudes of Protection of Nature, Polluting Nature, and Altering Nature had relatively high standard deviations. The other two attitudes (Intent of Support and Enjoyment of Nature) are related to personal concerns, while the first three are related to public concerns. Thus, the high standard deviation in these attitudes might be related to the dilemma of issues arising from the potential impact on the community or due to the pressure and desire to support the community. However, this phenomenon needs further exploration as the previous studies do not report similar results. Moreover, the attitudes in use in this study are relatively different from previous 2-MEV studies, so such a comparison is not plausible.

The two attitudes with low standard deviation, Intent of Support, and Enjoyment of Nature show an increasing tendency toward positive attitude from Grade 8 to 9, but not from 9 to 10. However, the other three attitudes with high standard deviations, which are related to public issues, show a positive increasing tendency toward attitudes from Grade 8–10. Although these increments are interpreted based on observation but not on the statistical test, this tendency is seen in Table 12. Thus, the relationship between items with an individual or community focus and their effects on attitudes needs further exploration.

The value of Preservation shows an increasing tendency from Grade 8 to 9, while Utilisation value shows a decreasing tendency from Grade 8 until 10. However, no observable tendency exists between values and attitudes with gender or age. Interestingly, Heinen [54] found literacy associated with attitude near the Koshi Wildlife Reserve. While, Meinhold and Malkus [23], and Johnson and Činčera [25] report high Preservation value in girls compared to boys, while Bogner and Wilhelm [55] found children in Grades 5 and 6 were more sensitive toward the environment compared to those in Grade 9. Although there is a large difference between Grades 5 or 6 and Grade 9, this study reports the increasing tendency of positive environmental values and attitudes with an increase of Grade from 8 to 9, and 9 to 10. Johnson and Manoli [42,56], Schneller et al. [43], and Bogner et al. [36] also suggest growth of positive attitudes, by using 2-MEV Scale, with education, but their study was based on environmental programmes with pre- and post-test but not on environmental education content followed at the children's school over a year. In the present study, the final survey was conducted at the end of the school's academic year.

Most 2-MEV studies report a low to moderate negative correlation between Preservation and Utilisation. For example, Schneller et al. [43] found a –0.26 correlation, while Johnson and Manoli [56] found –0.45. Also, having a low to moderate negative correlation between Preservation and Utilisation indicates that they are distinct yet related [37]. While this moderate negative relationship is more significant than Wiseman and Bogner's [35] claim (–0.174), they are much different from the strong relationship of –0.93 in this study. However, Milfont and Duckitt [37] also report a higher negative relationship of –0.72 between Preservation and Utilisation. They point out this might be due to the controlled direction of wording in the items, i.e., including both pro- and anti-environmentally worded items under both values to eliminate the direction of wording effects. However, wording

direction was not considered in this study. Moreover, the higher negative correlation might be due to the context of a different region or country [37].

As suggested by Bogner and Wilhelm [55], and Kibbe et al. [21], in Western culture, Utilisation is a product of self-interest to use the components of nature either to harm them or to enjoy them. However, in this study, the validated items under the Utilisation value suggest that the sample population utilised the aspects/resources of nature to get rid of their problems but not for their self-interest. For example, a river is going to flood their community; thus, diversion of the river is necessary. Likewise, waste is not collected for its proper disposal, so the best way to get rid of the waste is either throw it away in a flowing river or burn it. Similarly, not everyone has a bathroom in their home, thus the need to clean themselves in a river.

As a conclusion, this contrast between the developed and least-developed communities about the purpose and intent of utilisation of nature may have created this difference in correlation between Preservation and Utilisation compared to studies in other countries. Furthermore, the different attitudes in this study compared to other 2-MEV studies could also be another reason affecting the relationship between values. There is a need, however, to see if this relationship holds up in other studies in rural Nepal or similar places.

Corral-Verdugo and colleagues report no conflict in holding both pro- and anti-environmental belief in non-Western and non-industrialised countries such as Mexico and Brazil [41,76]. However, in rural Nepal, the case is observed to be different due to a high negative correlation, indicating strong Preservation associated with weak Utilisation values and vice-versa [37]. Thus, the relevance of dualism, as well as two dimensions in environmental values, strengthens. Likewise, the usage of 2-MEV Scale, based on its development and validation while regarding the local context, to analyse the environmental values and attitudes, is further verified. Finally, the majority of the children are inclined towards positive environmental values and attitudes in rural Nepal.

7. Conclusions

The relationship between the environmental values, of Preservation and Utilisation, is strong, but the negative correlation of –0.93 in rural Nepal, suggests that a child usually holds either a Preservation value or a Utilisation value. In general, our study finds that most of the children hold a Preservation value in the study site, which progresses with increasing grade. Likewise, the majority hold pro-environmental attitudes, which also progresses with increasing grade. The validated model of 2-MEV in rural Nepal demonstrates that the construct of environmental attitude is bi-dimensional in Nepal, thus further strengthening the debated bi-dimensional construct of environmental attitude. Moreover, the study provides additional evidence that by considering the local environment of the study site, the 2-MEV Scale can be used as a standard tool to analyse environmental attitudes globally.

Although this study strengthens the fact that the development of 2-MEV Scale for different regions around the world is possible reliably and validly, there are two issues to consider before undertaking it. First, the items should be adapted, developed and modified by considering the study site's socio-economic, cultural and environmental aspects as well as the need of the study. Second, our study shows different characters between the items which represent personal and communal intents. Hence, items with personal and communal intents must be separated in different scales or sub-scales. The Preservation and Utilisation are an essential aspect of balance in livelihood, wellbeing and management of the natural resources. The 2-MEV Scale addresses both these values and allows a psychometric analysis of the study population on this bi-dimensional continuum; this is the primary advantage of the 2-MEV Scale. Preservation and Utilisation are also the core values of sustainable development. Thus, the 2-MEV Scale can be used in various research by modifying and developing it to use in analysis and development of the policy of projects and formal as well as informal education programmes to address pro-environmental and sustainable development issues.

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