

Local perceptions of nature in Pinacanauan de Tuguegarao River corridor: A case study of Tuguegarao and Peñablanca residents in northeast Luzon, Philippines

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Abstract

Perceptions of local people play an important role in assessing their daily encounters and needs in their environment and can be useful measure towards the effective implementation of conservation programs. This study examines the various perceptions of local people on nature living in the landscape of Cagayan province situated in Northeast Luzon, Philippines. Using a combination of qualitative and quantitative methodologies, the research focused on study sites straddling along the Pinacanauan de Tuguegarao River. These included two villages within the municipality of Peñablanca and 18 villages of Tuguegarao City.

The research adopted a universal and systematic technique in the Netherlands called 'visions of nature' in addition to open interviews and photo-ranking approaches in examining local people's perceptions. Using stratified random sampling, a total of 120 households consisting of poor to middle class urban farmers, poor to middle class urban dwellers, poor to middle class lowland rural farmers and poor to middle class upland rural farmers were interviewed by means of semi-structured interviews. The background variables were gathered along with qualitative data encoded and subjected to statistical analysis.

A typology of perceptions was developed and classified into various types showing the functional and non-functional aspects of nature. Distributional scores were obtained and compared using a combination of independent and dependent variables. Our results showed that there is significant difference between major perceptions among the various occupational groups and significant differences as affected by a number of factors. Local people's perceptions are indeed affected by the environment they live in. Furthermore, the perceptions on nature by the urban dwellers are analogous to the visions of nature in the Western world.

Keywords: Local perceptions; Visions of nature; Urban dwellers; Urban farmers; Rural farmers; Nature-friendliness

Introduction

Perceptions are the constructions of images and stories influencing an individual's view of the world and himself (Marten 2001). These tend to modify ecosystem-based information incorporated within the realm of social system deemed important in the decision making process in order to achieve management actions. The perceptions in a certain degree are affected by their level of knowledge and values

(Benjamin et al. 2007) including other variables influencing their environment. Crow et al. (2006) studied perceptions of nature by the local people connected to the urban landscape. The perceptions of the general public were explored in the Netherlands by means of the overarching framework of 'visions of nature' (Van den Born et al. 2001; De Groot & Van den Born 2003). This is a systematic technique of evaluating concepts of nature held by the people consisting of three elements: (1) images of nature, (2) values of nature and (3) images of relationship. It was found out that nature-friendliness (biophilia) has been found to exist among the people, which was consistent to findings in the US and other European countries.

In the developing countries, studies on perceptions of nature are interlinked with knowledge and attitude which has been mainly confined within protected areas and national parks. In the Philippines, stakeholders in Mount Makiling Forest Reserve were knowledgeable of existing biodiversity conservation programs and envisaged for future training (Rebanco et al. 2006). Stoel (2007) argued that perceptions are constant depictions of social constructs with different stakeholders representing various interests in the Peñaflanca Protected Landscape and Seascape within the Sierra Madre. A study in Indonesia was conducted to investigate differences in perception, knowledge and awareness of environmental problems as influenced by environmental education and various factors (Sudarmadi et al. 2001). This dealt with the factors influencing perceptions between the educated and community groups. In the context of 'visions of nature' in non-western countries, studies are lacking on the conceptualization of nature looking directly at the perceptions of local people across the landscape.

There are early classifications made on ecosystem services which conceptually focused on the functions performed by the environment. Van der Maarel & Dauvellier (1978) categorized these functions into four, for example, production, carrying, information and regulation which is widely used in the Netherlands. In the context of value assessment, De Groot (1992) made a critical review of this 1978 classification and formulated a more comprehensive list of functions termed as 'CPSH + PR classification'. Also, the Millennium Ecosystem Assessment (MA) was developed as the scientific basis for planning and actions needed to enhance the contribution of ecosystems to human well being (Millennium Ecosystem Assessment 2005). This focused on 'ecosystem services' classified into provisioning, regulating, cultural and supporting groups.

This study aims to understand the perceptions of nature held by the local people living in the landscape continuum of northeast Luzon situated along the Pinacanauan de Tuguegarao river corridor draining into the Cagayan River. The main research questions to be addressed were:

- (1) What are the various perceptions and values of nature held by the local people? What is the general classification that could be derived based from their perceptions?
- (2) How do these perceptions influence their daily encounter with nature?
- (3) What are the factors affecting the perceptions of nature by the local people? Are there significant differences considering these factors towards their perceptions?

Methods

Study areas

The Pinacanauan de Tuguegarao River

The Pinacanauan de Tuguegarao River serves as a major tributary of the Cagayan River on the western side of the Northern Sierra Madre region. It forms one of two main rivers found within the Peñablanca Protected Landscape and Seascape (PPLS) which traverses the Pinacanauan watershed in the protected area. This provides water for the agricultural, domestic and development needs (PPLS Management Plan 2004) in the municipality of Peñablanca. The river serves as an ideal place for recreation including tourism activities, such as upriver boat trekking and the Bankarera Festival. It also serves as the gateway area before reaching the famous 'Callao Caves'. Furthermore, the river serves as an important water resource for the residents of Tuguegarao City. The Water District plans to utilize the surface water of the river and other springs in Peñablanca as an alternative measure of sustaining water supply (Amponin et al. 2007).

Tuguegarao City and Peñablanca municipality

Tuguegarao City is situated in Cagayan Valley Region in northeast Luzon bounded by Peñablanca municipality on the east and north by the municipality of Iguig, which are both in Cagayan province. On the south, it is bounded by the province of Isabela. It is almost surrounded and drained by the Cagayan River and Pinacanauan de Tuguegarao River. The total land area is 113.95 km². About 65% of the land consists of alluvial plains while the remaining area is hilly in the eastern part of the city.

The city is the capital of Cagayan province classified as a first class municipality consisting of 49 villages with 26 communities classified as urban. However, about 40% of the total land area is devoted to agricultural production which is situated in the city's rural areas. It is also considered as a trading hub of the Tobacco industry in the region.

The city's population is estimated to be 142,208 (Annual Development Plan 2008) while the average household size is 5 persons. The indigenous people called the Irayas and Itawes were the first settlers who depended on subsistence living mainly fishing, hunting and farming. During the early colonization period, these local people learned Ibanag from the Spaniards in spreading Christianity. Ibanags and Itawes are the dominant ethnic groups followed by Ilocanos and Tagalogs among the city population.

The municipality of Peñablanca is situated in the southeastern part of Cagayan province. It is nearby Tuguegarao City with a total land area of 1,193.20 km². The topography is characterized by various watersheds consisting of alluvial plains, valleys, hills and mountain ranges covering a large portion of the total land area. It encompasses the PPLS with 18 out of the 24 villages within the protected area. The municipality is endowed with natural landscape features making ecotourism as its main attraction. Coupled with this is the rich biodiversity of flora and fauna within the PPLS.

Peñablanca is a first class municipality consisting of 24 villages, with 21 classified as rural areas. The total population is 38,475 persons, majority of which are living in these areas. Peñablanca is predominantly agricultural in terms of livelihood. Most of the local residents depend on farming and fishing activities as their source of income. They mainly cultivate corn, rice and other cash crops and keep livestock in their

backyards. However, majority of them are tenants with few farmers involved in the government's community-based forest management program (Bennagen et al. 2007).

Itawes is the major dialect spoken (77.30%) by the populace followed by Ibanag (12.19%), Ilocano (6.93%) and other dialects (3.58%). Roman Catholic is the major religion in the municipality.

Sampling sites and design

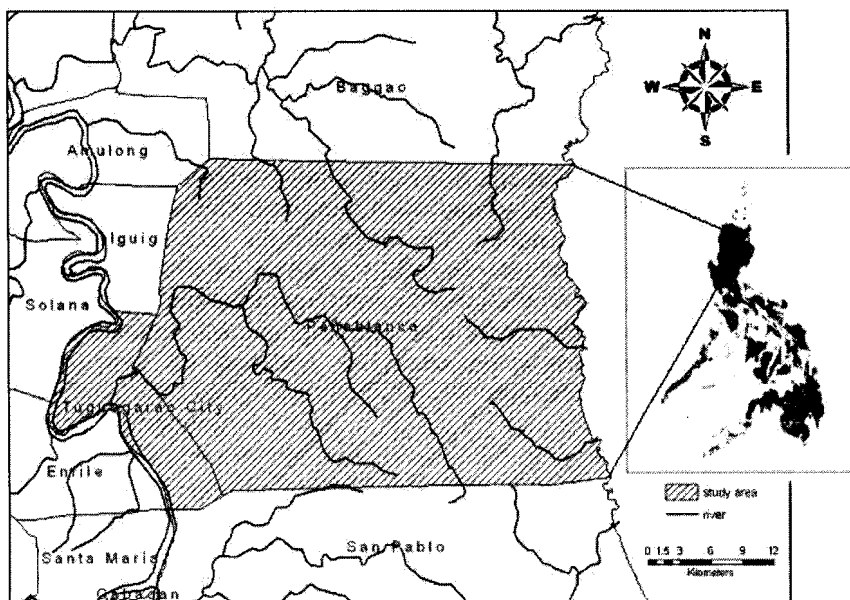


Figure 1: Location of the study area and map of the Philippines (inset).

The sampling design was made on the basis of clustering the local people based on four major groups representing homogeneity in terms of geographical place, land use or occupation, and social structure. These are (1) poor to middle class upland rural farmers, (2) poor to middle class lowland rural farmers, (3) poor to middle class urban dwellers and (4) poor to middle class urban farmers. Stratified random sampling was adopted to ensure fair representation and equal number of sample size was targeted for each population.

With regards to geographical place, the first two groups were based in the municipality of Peñablanca while the latter two were targeted in Tuguegarao City. The distinction between farmers and non-farmers (urban dwellers as we call them) is necessary to be examined. Difference in geographical place (lowland and upland) is the underlying factor among the farmers in the rural district of Peñablanca.

Sampling sites (Figure 1) were selected to straddle along the Pinacanauan de Tuguegarao River covering two villages in Peñablanca and 18 villages in Tuguegarao City. These are Minanga and Cabbo in Peñablanca, an upstream forest village and downstream agricultural community, respectively. Tuguegarao City, on the other hand, included densely built inner areas from *Centros* 1 to 12 and some communities surrounded by agricultural fields in the eastern periphery. The latter are mainly rice farming communities interspersed with few tobacco fields. An overall sample of 120 respondent interviews were carried out and equally divided among the different

population (30 each). The household respondents were randomly selected from the community census in each group using random starting point. The criterion for selecting the respondent interviewee ranged from 25 to 70 years of age. Gender-based post stratification was employed to get equal representation of men and women in both places.

The survey was conducted from June to September 2008. Data were collected by means of a questionnaire and open interview. The household respondents were mapped using ArcGIS 9.0 software.

‘Look at your surrounding’, an environmental song

Before starting the open-ended questions, the Filipino environmental song entitled *‘Masdan mo ang kapaligiran’*, a popular piece during the 1970s was played to introduce the topic of ‘nature’ for each respondent. By using a tape recorder, the music was played for about two minutes to allow the respondent to get familiar with the song and its content. The song was sung by the folk group *‘Asin’* (translated, Salts of the Earth), literally meaning ‘Look at your surrounding’. This illustrated the various elements of nature and human impacts on the environment which served as an effective material during the introduction of the concept. We interchangeably used the term ‘nature’ and ‘environment’ in some occasions for clarity and simplicity for the respondents to understand. However to be consistent in procedure, we used only the term nature, *verbatim* as framed in our questionnaire items.

Interviews of respondents

The interviews were administered utilizing a semi-structured questionnaire consisting of information to collect background variables followed by a series of open-ended questions to assess the perceptions of the local people about ‘nature’. The questionnaire was translated into the respective local dialects in the study area. Six open-ended questions were asked from the respondents, for instance, “Can you explain to me what nature is? Why?” and “In your view, what things or images in your surroundings do you consider as nature?” Other questions were “What aspects, things or purpose in life is nature important?”, “What specific purposes do you use these values of nature? Why are these values important to you?” and “Where are these values of nature located?” Lastly, we asked the respondents “How do you use nature for your livelihood activities?”

The research followed a combination of qualitative and quantitative methodological approach. This technique generated qualitative data and enhanced conceptual validity in the process. The qualitative data obtained were subjected to quantitative method of analysis. The results of the questionnaire were transcribed and coded according to occupational group using Microsoft Excel program.

Images of nature

The respondents were asked to rank a set of 10 different images representing photographs of local environments using a scale of 1 to 10 (1 being the highest and 10 as lowest). The typology of the images reflected a modification of the ‘visions of nature’ study (Van den Born et al. 2001), which comprised the element on ‘Images of Nature’. The photographs were selected to illustrate the various classification of nature images defined in previous studies (Natuurbeschermingsraad 1993; Buijs & Volker 1997) such as wild nature, arcadian nature, domesticated nature and penetrant nature. After the ranking exercise, the

respondents were given time to explain their criteria for ranking the set of images that verified their perceptions.

Statistical analyses

The data on background variables and qualitative responses from the open-ended interviews were imported from Microsoft Excel and analyzed using the software Statistical Package for the Social Sciences (SPSS) Version 14. The background variables on education, income and class were modified into ordinal data consisting of three groups per variable. The qualitative data on perceptions generated from the open-ended responses were categorized based on congeners of scientific literature into a typology of classification. A code of 1 was assigned if the respondent signified or mentioned the perception, while 0 was coded to depict the absence of the perception from the respondent's statement. Test of normality and homogeneity of variance was executed to determine the appropriate statistical test and a 0.05 level was used to determine statistical significance.

Using 95% confidence interval, the mean number of perceptions across the different occupational groups was shown in a graph. Wilcoxon two-related samples test was also carried out to identify significant differences between the major types of perceptions. A Chi-square (χ^2) test of independence was performed to compare significant association of proportions among the occupational groups with respect to their type of perceptions.

The non-parametric Kruskal-Wallis test was applied to establish differences among the background variables with regards to the respondent's perceptions of nature. The test was also used to investigate significant differences in perceptions derived from the images of nature ranking exercise among the occupational groups.

In specifying which among the occupational groups have significant variations in their perceptions, Mann-Whitney test was conducted through pair wise comparison of groups.

Classification and characteristics of respondents

The respondents were classified based on a stratified random sample characterized by occupational groups. These included (1) poor to middle class upland rural farmers, (2) poor to middle class lowland rural farmers, (3) poor to middle class urban dwellers and (4) poor to middle class urban farmers. A total sample size of 120 respondents was interviewed, equally represented by 30 households (25%) in each group.

An equal number of men and women (50%) respondents each were interviewed to ensure fair representation according to gender. In general, this corresponded to the gender ratio in the municipality of Peñablanca and Tuguegarao City. Majority of the respondents belonged to the Catholic (80%) church, while the rest are members of other non-Catholic (20%) groups, i.e., Presbyterian, Born-Again Christian, Jehovah's Witness, etc. About 95% of them are married, 1.7% is single, widow comprised 2.5% and 0.8% for live-in. The age distribution is clustered between 41 to 56 years old, with a mean age of 45.6 years. This just slightly differed with the study of Amponin et al. (2007) having a mean age of 44 years in Tuguegarao City.

The mean household monthly income is PhP 5,548 with an observed minimum monthly income of PhP 300 and maximum income of PhP 30,000. We categorized the respondents' income dataset into three groups and their percentage as follows: PhP 1-5k (67.5%), PhP 5.1-10k (22.5%) and PhP 10.1k-above (10%). In terms of education,

majority of the respondents have either reached or completed elementary level (51.7%). Only 25% have attended high school or graduated, while 23.3% have college or postgraduate status. In this study, we arbitrarily produced class level as a function of social status, income, visible wealth and educational level of the respondents. The results showed that 53.3% belonged to the low class, whereas 24.2% and 22.5% were middle and high class, respectively.

The new perspective of nature: towards understanding people's perceptions

Images of nature

Table 1 shows the different types of nature images as adapted from Van den Born et al. (2001) and their mean ranking scores according to occupational groups. As a whole, farmers have basically similar ranking results up to the fifth order ascribing highest rank to the corn field (1) followed by the river (2), carabao in the paddy (3), rainforest (4) and vegetable homegarden (5). However, the urban farmers in Tuguegarao City, ranked the river (1) as the highest, instead of the corn field (2) and by the others (same as above). The urban dwellers varied in their ranking perception as they placed the rainforest (1) as the highest, then the river (2), mountain and caves (3), carabao in the paddy (4) and the corn field (5). For the criteria used in ranking the images, the respondents specified one or more reasons based on their perceptions of nature. The reasons along with their computed percentage in descending order as follows: livelihood needs and importance (77%), naturalness (21%), created by God (10%), beauty (8%), see and experience (7%), fresh air and protection (4%) and lastly, restoration, and preservation (2.5%). Typical reasons of livelihood and its importance was posited by a rural lowland farmer saying, "It supports livelihood like corn is for everyone, it has good benefits". An urban farmer also stated "It is the source of our food and livelihood" which basically reflected their daily needs for subsistence living. On the other end, there were few respondents who stated naturalness in perceiving nature through the ranking exercise. For example, an urban dweller explicitly claimed that, "I foremost considered nature to be absolutely created by God and natural". Despite many farmers stated livelihood and importance as a main criterion, 18% of them still viewed nature as something which is natural, like an upland farmer was quoted saying, "It is God's creation and it is natural".

The results obtained from Kruskal-Wallis Test suggested statistically significant association between the occupational groups and nature images ranking related to the corn field, rainforest, carabao in the paddy and mountain and caves. Highly significant difference was found highest in the corn field (Kruskal-Wallis, $H = 14.49$, $df = 3$, p -value = 0.002), which could be associated to the 'grain fields' under arcadian nature. The image of the carabao in the paddy characterized the same type, while both images of rainforest and mountain and caves were considered as wild nature. The latter two ascribed for the same statistical significance as shown in Table 1.

Table 1: Image of nature with the mean score and standard deviation by occupational groups.

Image of Nature	Upland Poor to Middle Rural Farmer	Lowland Poor to Middle Rural Farmer	Poor to Middle Urban Farmer	Poor to Middle Urban Dweller	Kruskal-Wallis Test
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	<i>p</i> -value
River	3.43 (2.08)	3.50 (2.01)	3.03 (2.47)	2.80 (1.63)	0.335
Corn field	2.90 (2.20)	3.40 (3.00)	3.37 (2.37)	5.27 (2.16)	0.002*
Rainforest	4.53 (2.74)	4.43 (2.87)	4.40 (2.69)	2.60 (2.27)	0.007*
Carabao in the paddy	3.67 (2.26)	3.93 (2.35)	3.93 (2.10)	5.20 (1.63)	0.021*
Vegetable homegarden	5.07 (2.07)	5.23 (2.11)	5.63 (1.97)	6.43 (2.76)	0.103
Mountain and caves	6.67 (2.84)	6.40 (3.15)	5.97 (3.32)	4.00 (2.53)	0.007*
Chickens in the backyard	6.00 (2.13)	6.30 (2.04)	6.33 (2.48)	6.80 (2.17)	0.536
Rugged roads	6.40 (2.09)	6.67 (1.95)	6.70 (2.17)	6.97 (2.65)	0.716
Weeds in the garden	7.83 (2.21)	7.13 (2.53)	7.57 (2.06)	6.63 (2.48)	0.221
Flower garden	8.50 (1.96)	8.00 (2.27)	8.07 (1.87)	8.30 (2.29)	0.627

Ranking is based from a value of 1 to 10, 1 with highest priority while 10 have the least value.

*Statistically significant at 0.05 significance level.

Perceptions of nature

We have categorized the responses from the open-ended interviews into two major types of perception and classified into a matrix. This was divided into sub-groups on the basis of scientific literature. The major types produced were (1) utilitarian view and (2) broad outlook, which can principally be attributed to the classification of ecosystem goods and services specified in the Millennium Ecosystem Assessment. As shown in Table 2, 'utilitarian views' included four types which were directly linked to the provisioning functions of the ecosystem. These are natural food, natural non-food, semi-natural food, semi-natural non-food. Perceptions related to 'broad outlook' consisted of three sub-groups, namely regulation and processing functions, signification (De Groot 1992) and cultural and other non-functional perceptions. The first two functions were again modified from previous scientific constructs in the field of ecosystem services. We have added the last category in order to represent other types of perceptions which are not directly associated with the ecosystem functions and services. The regulation and processing functions included eight items, specifically medicinal and health, water production, water cycle and regulation, air and oxygen regulation, weather regulation and protection, disaster prevention, pollution prevention and sequestration, and lastly pollination and bio-control. Under the subcategory on signification and cultural, three were listed such as aesthetic and recuperation, recreation and tourism, and spirituality and oneness. Furthermore, the sub-group of non-functional perceptions incorporated five components in the classification. These were biotic and abiotic structures, non-natural structures, spontaneity and naturalness, God's creation and life existence, including duty and normative related perception.

Qualitative responses were classified using a coding scheme. A value of 1 or 0 was used indicating presence or absence, respectively. This was quantified according to

frequency for each type of perception across the occupational groups. The summary of perceptions and frequency results generated from the study are shown in Table 2.

Utilitarian view versus broad outlook

The mean scores were computed for the two major types of perceptions with respect to the occupational groups and shown in a graph (Figure 2). In terms of utilitarian view, the 'lowland poor to middle rural farmers' recorded the highest mean of 2.53 ± 0.97 , then by the other groups of farmers. The 'poor to middle urban dwellers' scored the lowest mean of 1.47 ± 0.63 , ranking least among them. On the contrary, the urban dwellers ascribed the highest mean of 5.13 ± 2.24 considering their broad outlook of nature. The urban farmer respondents followed next, then by the upland farmers with the lowland farmers having the lowest number of perceptions at 2.77 ± 1.83 . Error bars showing 95% confidence interval of the mean were also illustrated in the graph.

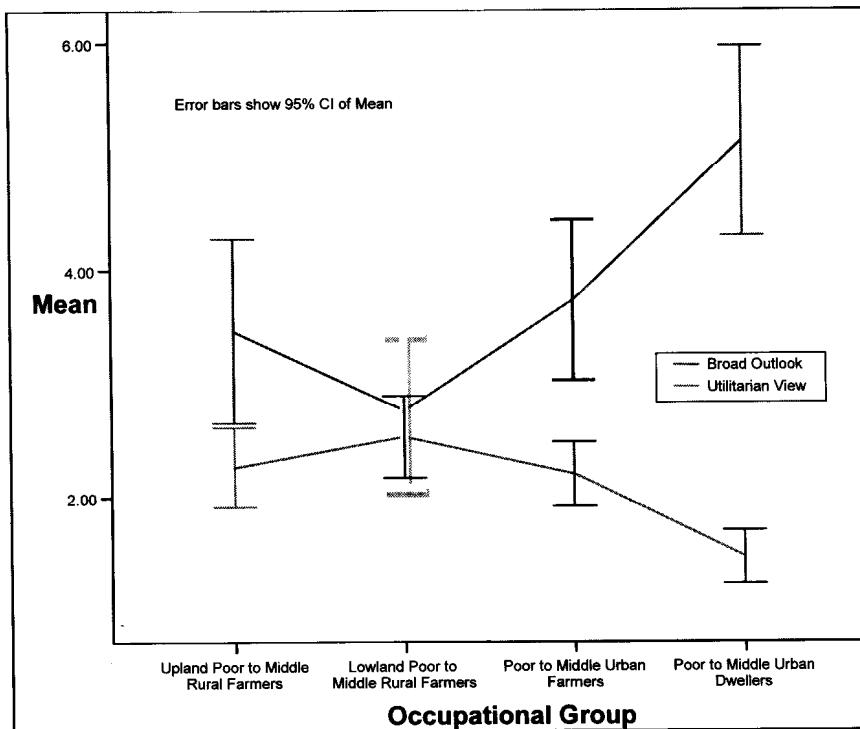


Figure 2: Graph showing utilitarian view and broad outlook by occupational groups.

The Wilcoxon Test yielded significant differences between the median perception scores with respect to utilitarian view and broad outlook of nature in all the groups, except the lowland rural farmers. Highest significance (p -value = 0.000) was observed in both the poor to middle urban farmers and urban dwellers. On a lesser extent, the association between the two types of perceptions are likewise statistically significant among the upland rural farmers (p -value = 0.022).

Classification of perceptions

Table 2 showed that quantitative distributions of the different perceptions varied within occupational groups. Similarly, there were also observed differences in proportions for each type of perception among the occupational groups. Firstly, we analyzed which of the perceptual items tallied a frequency of at least half (50%) of the total number of respondents (30 each) as a basis for each occupational group. The upland rural farmers' utilitarian view or provisioning functions have perceived items on semi-natural food (100%) and semi-natural non-food (60%). On the other end, their broad outlook of nature consisted of three items following the basis above. These included, specifically, water production (60%), aesthetic and recuperation (53.3%), and biotic and abiotic structure (50%). There were three functional perceptions under utilitarian view ascribed by the lowland rural farmers namely, semi-natural food (96.7%), semi-natural non-food (63.3%) and natural non-food (60%). Only water production function was perceived by at least half (56.7%) of the respondents among them. The urban farmers (including few fishermen) have perceived both semi-natural food (100%) and semi-natural non-food (56.7%) under provisioning functions. Similar to the lowland farmers, they considered only water production function (76.7%) in their broad outlook of nature. However, the high percentage obtained as revealed by the majority reflected their higher perception of this functional value. This was also the highest figure among the occupational groups (Table 2). The urban dwellers only recognized the semi-natural food function (90%) contrary to the farmers' other utilitarian views. In terms of their broad outlook of nature, the results suggested air and oxygen regulation (60%) and aesthetic and recuperation (50%) gaining the highest proportion among the respondents.

The results of the overall proportion on the different types of perceptions among the respondents are shown in descending order as follows: semi-natural food (96.7%), water production (60%), semi-natural non-food (49.2%), aesthetic and recuperation (45%), natural non-food (43.3%), biotic and abiotic structure (40%), duty and normative (33.3%), air and oxygen regulation (31.7%), pollination and bio-control (30.8%), medicinal and health (24.2%), natural food (22.5%), disaster prevention (21.7%), God's creation and life (21.7%), spontaneous and natural (15.8%), weather regulation (15.8%), water cycle and regulation (11.7%), recreation and tourism (9.2%), non-natural structure (7.5%), pollution prevention (5%), and spirituality and oneness (4.2%).

Almost all of the respondents from the different groups recognized the semi-natural food function of nature as depicted by high percentages. The upland rural farmers and urban farmers both accounted for 100%, followed by the lowland rural farmers (96.7%) and urban dwellers (90%). For instance, a rural farmer in the lowland claimed the importance of nature as, "It is the source of livelihood, like cultivation of corn and vegetables. It is the source of income". However, natural non-food function ranking fifth in the overall proportion indicated differences among the groups (Table 2). The figures in terms of the broad outlook of nature were relatively similar across the groups for functions related to water production, aesthetic and recuperation, and biotic and abiotic structure. Water production was consistently mentioned as one of the values by all the respondents for instance depicted in descending order, urban farmers (76.7%), upland farmers (60%), lowland farmers (56.7%), and the urban dwellers (46.7%). When asked about the specific purposes they use the values of nature, an urban farmer stated "Water is valuable because you cannot cultivate without water". The functional item on aesthetic and recuperation was likewise stated with the following percentages: upland farmers (53.3%), urban dwellers (50%), lowland farmers (43.3%), and the urban farmers (33.3%). Perceptions on the biotic and abiotic structure, classified as non-functional attributes

showed highest among the upland farmers (50%), then by urban dwellers (46.7%), urban farmers (36.7%), and the lowland farmers (26.7%). Some of these were signified by upland farmers revealing their values from statement such as, “It is the perch of the birds and animals in the forest”. This is also true for an urban dweller when viewing things or images in the surrounding who claimed that “Nature is the trees in the surrounding, including the bees and the birds”. Furthermore, the non-functional perception on duty and normative, ranking 7th in the overall yielded the following percentages among the groups: urban dwellers (40%), lowland and urban farmers (33.3%), and the upland farmers (26.7%). For example, one of the urban farmer respondents has commented, “Nature must be conserved and protected because it is the natural resources”.

Statistically significant association were detected at a significance level of 0.05 between the occupational groups and perceptions related to the provisioning function of semi-natural non-food ($\chi^2 = 17.17$; $df = 3$; p -value = 0.001); broad outlook perceptions on air and oxygen regulation ($\chi^2 = 15.25$; $df = 3$; p -value = 0.002), and medicinal and health ($\chi^2 = 11.41$; $df = 3$; p -value = 0.010) including the non-functional type on God’s creation and life ($\chi^2 = 10.02$; $df = 3$; p -value = 0.018). Semi-natural non-food function ascribed for relatively high percentage values among the three groups of farmers compared to the urban dwellers as shown in Table 2. In contrast, the urban dwellers ascribed high values with respect to medicinal and health function plus air and oxygen regulation over the farmers. This could have explained the significant differences among the groups in terms of broad outlook of nature. Under God’s creation and life perception, similar percentages were obtained for the urban farmers and dwellers (33.3%), then by the upland farmers (13.3%) and least perceived by the lowland farmers (6.7%).

Table 2: Classification of perceptions with frequency and proportion in percentage by occupational groups.

Types of Perceptions Based on Functions	Upland Poor to Middle Rural Farmer	Lowland Poor to Middle Rural Farmer	Poor to Middle Urban Farmer	Poor to Middle Urban Dweller	Total Count
	Frequency (Prop %)	Frequency (Prop %)	Frequency (Prop %)	Frequency (Prop %)	(Overall Prop %)
<i>Provisioning</i>					
Natural food	6 (20.0)	10 (33.3)	8 (26.7)	3 (10.0)	27 (22.5)
Natural non-food	14 (46.7)	18 (60.0)	11 (36.7)	9 (30.0)	52 (43.3)
Semi-natural food	30 (100.0)	29 (96.7)	30 (100.0)	27 (90.0)	116 (96.7)
Semi-natural non-food	18 (60.0)	19 (63.3)	17 (56.7)	5 (16.7)	59 (49.2)
<i>Regulation and processing</i>					
Medicinal and health	8 (26.7)	2 (6.7)	6 (20.0)	13 (43.3)	29 (24.2)
Water production	18 (60.0)	17 (56.7)	23 (76.7)	14 (46.7)	72 (60.0)
Water cycle and regulation	2 (6.7)	4 (13.3)	2 (6.7)	6 (20.0)	14 (11.7)
Air and oxygen regulation	6 (20.0)	6 (20.0)	8 (26.7)	18 (60.0)	38 (31.7)
Weather regulation	4 (13.3)	3 (10.0)	3 (10.0)	9 (30.0)	19 (15.8)
Disaster prevention	5 (16.7)	5 (16.7)	6 (20.0)	10 (33.3)	26 (21.7)
Pollution prevention	1 (3.3)	1 (3.3)	0 (0.0)	4 (13.3)	6 (5.0)
Pollination and bio-control	9 (30.0)	7 (23.3)	11 (36.7)	10 (33.3)	37 (30.8)

Types of Perceptions Based on Functions	Upland Poor to Middle Rural Farmer	Lowland Poor to Middle Rural Farmer	Poor to Middle Urban Farmer	Poor to Middle Urban Dweller	Total Count
	Frequency (Prop %)	Frequency (Prop %)	Frequency (Prop %)	Frequency (Prop %)	(Overall Prop %)
<i>Signification and cultural</i>					
Aesthetic and recuperation	16 (53.3)	13 (43.3)	10 (33.3)	15 (50.0)	54 (45.0)
Recreation and tourism	1 (3.3)	1 (3.3)	5 (16.7)	4 (13.3)	11 (9.2)
Spirituality and oneness	2 (6.7)	0 (0.0)	1 (3.3)	2 (6.7)	5 (4.2)
<i>Non-functional perception</i>					
Biotic and abiotic structure	15 (50.0)	8 (26.7)	11 (36.7)	14 (46.7)	48 (40.0)
Non-natural structure	1 (3.3)	3 (10.0)	3 (10.0)	2 (6.7)	9 (7.5)
Spontaneous and natural	4 (13.3)	1 (3.3)	3 (10.0)	11 (36.7)	19 (15.8)
God' creation and life	4 (13.3)	2 (6.7)	10 (33.3)	10 (33.3)	26 (21.7)
Duty and normative	8 (26.7)	10 (33.3)	10 (33.3)	12 (40.0)	40 (33.3)

Differences in perceptions among respondents based on background variables

Table 3 presents the statistical results of Kruskal-Wallis test for the different background variables across the two major types of perceptions. There were highly significant differences among the occupational groups with respect to the number of perceptions as utilitarian view (Kruskal-Wallis, $H = 24.40$, $df = 3$, p -value = 0.000) and broad outlook (Kruskal-Wallis, $H = 17.00$, $df = 3$, p -value = 0.001) of nature. There were no significant variations between the background variables of religion, gender and civil status, and the number of perceptions related to both utilitarian view and broad outlook of nature. However, there were only significant differences between income category in relation to their broad outlook of nature (Kruskal-Wallis, $H = 7.43$, $df = 2$, p -value = 0.024).

The number of perceptions related to utilitarian view significantly differed among the respondents in terms of educational groups (Kruskal-Wallis, $H = 6.67$, $df = 2$, p -value = 0.036) and class levels (Kruskal-Wallis, $H = 9.18$, $df = 2$, p -value = 0.010). For the broad outlook of nature, there were also significant differences detected among different levels of education (Kruskal-Wallis, $H = 19.46$, $df = 2$, p -value = 0.000) and class categories (Kruskal-Wallis, $H = 18.39$, $df = 2$, p -value = 0.000).

Table 3: Kruskal-Wallis Test for background variables across the two major types of perceptions.

Image of Nature	Utilitarian View		Broad Outlook	
	χ^2	p -value	χ^2	p -value
Occupational group	24.403	0.000*	17.001	0.001*
Religion	0.223	0.637	1.833	0.176
Gender	3.427	0.064	1.471	0.225
Civil status	2.576	0.462	3.859	0.277
Income	1.998	0.368	7.434	0.024*
Education	6.668	0.036*	19.459	0.000*

Image of Nature	Utilitarian View		Broad Outlook	
	χ^2	<i>p</i> -value	χ^2	<i>p</i> -value
Class	9.176	0.010*	18.389	0.000*

*Statistically significant at 0.05 significance level.

Differences in perceptions among occupational groups

Results from Mann-Whitney Test revealed significant differences between the urban dwellers and groups of farmers with respect to the number of perceptions as utilitarian view and broad outlook of nature. In terms of utilitarian view, the urban dwellers significantly differed from the upland farmers (*p*-value = 0.000), lowland farmers (*p*-value = 0.000) and urban farmers (*p*-value = 0.000). Significant differences were likewise found between them and the farmers considering their broad outlook of nature as follows: upland farmers (*p*-value = 0.006), lowland farmers (*p*-value = 0.000) and urban farmers (*p*-value = 0.017). Among the farmers, there was significant difference only between the lowland farmers and urban farmers (*p*-value = 0.039) with regards to their broad outlook of nature. The number of perceptions as to utilitarian view between these two groups is not statistically significant.

Discussion

Our results showed that based from the photograph ranking exercise on the images of nature, farmers and urban dwellers generally have different perceptions of nature. The urban dwellers have a higher preference for wild nature consisting of rainforest, river and mountain and caves over the other types of nature. This type of nature has also been defined as elementary nature (Buijs & Volker 1997) which ascribed for the highest degree of naturalness by the Dutch populace (De Groot & Van den Born 2003). In a perception study conducted in the United States, the suburban residents of Riverside similarly asserted nature as the wild look of natural landscapes (Crow et al. 2006). In a general sense, most of the urban respondents in this study conceptualized nature to be something natural in condition. On the contrary, the perceptions of the farmers leaned towards images which are aptly arcadian (Schama 1995; Eisenberg 1998) in character, with preferences mainly on images which involved human activities. Their type of nature, included corn field and carabao in the paddy, symbolized not only human intervention but also a source of livelihood important to their daily lives. This was also observed among German women farmers who viewed nature as an agricultural commodity for economic purposes (Modelmog 1998). One major commonality between the farmers and urban dwellers is their similar high ranking for the river. As De Groot & Van den Born (2003) posit, this type of nature represents a landscape of untamed nature and wilderness in the Western countries. Perceptions of nature among the local people may differ in this respect, but it only showed that the river serves an important function to both farmers and urban dwellers. Expressions of naturalness and desires for recreation and tourism particularly with Callao Caves in the backdrop may be prevalent among the urban dwellers. However, for the farmers both urban and rural, this serves as a vital resource in their farming activities mainly as a source of irrigation water.

The overall ranking preferences of nature coincided with the stated reasons of the local people as majority of them attributed the livelihood facet of nature. However, still few of the respondents have the notion of naturalness. They view nature as inherently

natural without the influence of human beings (Vining et al. 2008). However, more respondents adhered more to the strong association of nature and livelihood, which is biased towards arcadian nature. The concept of naturalness to a few could be interlinked with God's creation which the people have long experienced in their life. This has also been observed among the local people in Uganda who regard the elephants as God's beauty living in coexistence since they were born (Hill 1998). Linking the perceptual ranking results, the significant differences noted among the occupational groups with respect to the four images of nature supported the clear distinction between wild and arcadian nature by the local people.

The study attempted to integrate the principles behind the classification of ecosystem services by the Millennium Ecosystem Assessment (2005) with other scientific information. A number of classification types was generated from previous works, reclassified and developed a new classification scheme that is coherent with the perceptual context of the local people. Two major types were identified, utilitarian and the broad outlook of nature which relatively showed a diverse set of perceptions. Although people highly recognize the livelihood function of nature, categorically utilitarian, the non-functional aspects of nature were also deemed important by the local people. Specifically, we refer to items such as expressions of normative and duty, biotic and abiotic structures, God's creation and life, including spontaneous and natural. In this study, we explored for more extensive non-functional services in which local people do not use at all in their daily encounter with nature towards a comprehensive assessment of their own perceptions.

Comparing between the two major types of perceptions, the lowland farmers relatively have the same number of perceptions as opposed to the urban dwellers which exhibited higher dispersion of mean values. All of the respondents have recognized the semi-natural food function of nature, as this formed part of their daily survival. However, the urban dwellers did not give preferences over the other items under utilitarian view compared to the group of farmers. As such, this pointed out that they are not at all concern with both the natural and semi-natural non-food functions of nature, which explained the significant difference. Accordingly, this included perceptions which are mostly harvesting natural trees or planted gmelina (*Gmelina arborea*) timber and other non-food products from nature, e.g. firewood gathering. Forest patches in the landscape of northeast Luzon help meet the local demands of the people for fuel wood, timber and other ecosystem services (Snelder 2001). Trees are also planted in farm fields for the purpose of timber for house construction, furniture and other minor uses (Schuren & Snelder 2008), which refer to the semi-natural non-food functions. The aesthetic and recreational function of nature seemingly played an important value among the local people. In general, the beauty and tranquility of nature (Ulrich 1981; Schroeder 1996; Crow et al. 2006) was commonly appreciated by some respondents with upland farmers and urban dwellers (Matsuoka & Kaplan 2008) showing more preference. A similar pattern was also observed among the ethnic villagers living in the northern forested uplands of Thailand who revealed the importance of the aesthetic value of trees (Hares 2008). This proved one indication of nature-friendliness (biophilia) which is inadvertently evident among the respondents. Quantitative research illustrated that such acts of biophilia has already been prevalent in the western countries (Van den Born et al. 2001). This also supported the Thunian theory that some form of biophilia has already been in existence in the fourth frontier forming the urban core (De Groot 2003; Van der Ploeg 2003). The biotic and abiotic structures distinguished by the local people also showed highest preference among the upland farmers and urban dwellers. In this respect, biodiversity concepts related to wild nature, for example, the birds and trees were

classified under this item as a non-functional aspect of nature simply pertaining to their existence. Nevertheless, a perception study in Finland showed that local people often associated biodiversity with aesthetic values (Soini & Aakkula 2007). Local people also conceived normative and duty expressions about nature, for instance, signifying concepts of cleanliness and protection of nature, among others. The preference for water production after the semi-natural food function substantiated the results obtained from the photo ranking placing the river as second. It established the link between their high preference of the river image and as a source of irrigation water coming from the Pinacanauan de Tuguegarao River to support their farming needs. Some urban dweller respondents in Tuguegarao City perceived that the river provides them water for domestic usage. The air and oxygen regulation function of nature is remarkably recognized by the urban dwellers of Tuguegarao City. In particular, air pollution and health related concerns prompted the urban dwellers to long for fresh and clean air from nature. They give importance to the breeze coming from the trees and the river. This is to some extent associated with the medicinal and health function. It is relatively perceived the same way by the urban dwellers which also accounted for a significant difference. A study in the Netherlands also showed the highest preference for human health as one of the important functions of nature (Van den Born et al. 2001). One of the important non-functional aspects of nature viewed by the local people is God's creation and life. This was acknowledged mostly by the urban dwellers and urban farmers of Tuguegarao City.

We conjectured the theory that nature is mainly an urban affair stressing on the non-functional aspects of it. This can be fundamentally derived from statistically significant results obtained using the background variables of occupational groups, income category, educational and class levels. These factors have largely influenced the degree of living and type of environment present in the area. Farming experience affects the perceptions of landscape by the general populace in the Netherlands (Van den Berg & Koole 2006). The educational background of the respondents has also been a major factor influencing the level of perceptions about nature. Sudarmadi et al. (2001) recommended that enhancing education among the local people will foster environmental activities in developing countries. Papageorgiou (2001) also reported that education was seen to be an effective tool for conservation in Vikos-Aoos national park. The level of class has also largely influenced their perceptions considering it as a function of education, income, visible wealth and status. In England, a case study of the Peak District National Park showed that social class has a significant role in the visitors' perceptions of the landscape in the park (Suckall et al. 2009). We can assume from our results that as income, education and class level increases, the broad outlook of nature also increases. On the contrary, as these factors decline, we can expect a higher perception of utilitarian views by the local people. Furthermore, as local people gain higher perceptions on the broad outlook of nature, they tend to have lesser utilitarian views on nature or the environment they live in.

Acknowledgements

This study was supported by the Louwes Fund on Water and Food Research, under the framework of the Cagayan Valley Program on Environment and Development (CVPED) of Isabela State University. This formed part of the PhD dissertation conducted by the lead author under the Institute of Environmental Sciences of Leiden University. We would like to thank the local people of Tuguegarao City and Peñablanca municipality in sharing with us their time and efforts. Our gratitude also goes to the village officials

especially to *Kapitan* Eduard Bangayan. We are also grateful to Dr. Andy Masipiqueña and Drs. Merlijn Van Weerd of CVPED for supervising our fieldwork, including the staff for their support. Lastly, we are indebted to Sany Boy Malayao for his invaluable efforts and unwavering patience during the research.

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