

## From Paper Parks to Real Conservations: Case Study of Social Capital in Iran's Biodiversity Conservation

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**ABSTRACT:** The proposition that natural areas need protection from the destructive actions of people is widely accepted. This paper examines Iran's e-society attitudes and capital towards biodiversity conservation and evaluates economically Iran's national parks (NPs). 2,121 respondents answered an online questionnaire conducted in summer 2012. The majority of respondents had visited one of Iran's NPs. Almost all respondents were willing to voluntarily participate in conservation and environmental projects; willing to pay for protection; willing to increase the protected areas; willing to visit the NPs in the future; and they were mostly young. There is a resurgent interest in conservation amongst Iranian citizen scientists. Respondents showed that they could collaborate for resource management. They think ecological problems and solutions are human problems and not simply biological problems. Biodiversity conservation in Iran has been threatened by mismanagement, lack of funds, park-other organization conflict, lack of biodiversity awareness, and lack of public participation. Conservation biologists can help engage Iran's society in conservation efforts by striving to achieve three goals: adjusting the public's perception of biodiversity, increasing public participation in biodiversity conservation, and encouraging ecotourism by tour packages to develop conservation and local. Furthermore, the government should see the human and environmental condition as one intricate system. The governor must focus on conservation projects that engage the urban populace and support the goal of developing a biodiversity ethic. It should consider updating management, enhancing environmental educational programs, designing environmental volunteer plans, treating ecotourism tour packages, installing real collaborative principles, and establishing co-management and community-based conservation.

**Key words:** National Park, Ecotourism, Willingness to Pay, E-society, Co-management

### INTRODUCTION

The establishment of protected areas (Pas) is perhaps the longest-standing, most widely practiced, and best-funded approach to maintaining environmental services (Chomitz 2007; Yakhkeshi 2002). But their establishment has sometimes involved the displacement of, and loss of assets by people (Ghimire and Pimbert 1997; Geisler and Sousa 2001; Smardona and Faust 2006; Leco *et al.*, 2013; Mondejar-Jimenez *et al.*, 2013; Javaherian *et al.*, 2013; Masnavi, 2013; Nejadi *et al.*, 2012; Aminzadeh and Ghorashi, 2007). Conflicts between management of Pas and communities are increasing in many countries (Munasinghe and McNeely 1994). Nowadays, peoples are becoming increasingly common at international conservation events (Brockington *et al.* 2008; Fuller 2004; Odindi and Mhangara, 2012; Rasouli *et al.*, 2012; Spanou *et al.*, 2012; Zagas *et al.*, 2010; Vicente and Cerezo, 2010; Dehghani *et al.*, 2010; Hedjazi and Arabi, 2009;

Micareelli and Pizzioli, 2008) and there is a trend towards permitting multiple uses for Pas. Subsequently, the mission of Pas has expanded from biodiversity conservation to improving human welfare (Naughton *et al.*, 2005). There has also been a trend to educate, increase awareness and income, and to actively engage local people in the co-management and sustainable use of Pas (IBRD 2011; Munasinghe and McNeely 1994; Braatz 1992), to protect the diversity of species and communities (Muller *et al.* 2011). According to recent scaling-up conservation guidelines, the governments must ensure that their people are aware of the values of biodiversity and engaged in support of conservation and ecosystem services by 2020 (COP11, 2012).

Pas are expensive to establish and operate. However, it is less costly to protect their ecological integrity and manage their goods and services before

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biodiversity and environmental values are lost, than to restore them later. On the other hand, the establishment of Pas does not guarantee that their objectives will be achieved. The reports show that still, there remains a poor linkage between (1) the production of resource materials, (2) the education and training of competent professionals, (3) the achievement of certified high standards of Pas management effectiveness, and (4) the measurement of conservation outcomes (IUCN-web, 2012). Thus the governments must ensure that their Pas are well managed (IUCN-Jeju, 2012).

The public can help with conservation. The best way to get people to internalize a biodiversity ethic is to have them participate in ecological stewardship (Schwartz, 2006). There is growing recognition of the effectiveness of local groups and the idea of important social capital assets in bringing and gaining positive biodiversity outcomes (Pretty and Smith, 2004). In addition, citizen scientists can effectively help collect valuable data on ecological systems, and they cultivate an ethic of conservation stewardship in the developing world (Schwartz, 2006). Therefore, Pretty and Ward (2001) have identified four central features of social capital including (i) relations of trust; (ii) reciprocity and exchanges; (iii) common rules, norms, and sanctions; and (iv) connectedness in networks and groups.

In developing countries, conservation funds are extremely scarce and come mostly from one source (Baral *et al.*, 2008). These aspects are unlikely to be sustainable in the long-term management of conservation lands (Dixon & Sherman, 1990; Navrud and Mungatana, 1994). As a result, underfunding hinders conservation or development objectives and activities (IUCN, 2005). Therefore, many Pas exist merely on paper (Baral *et al.*, 2008; Kolahi *et al.*, 2012).

Economic considerations generally play a key role in decisions. Subsequently, the economic valuation of ecosystem services has received special attention in recent years. In the developing world also, economic valuation of environmental services of protected natural areas is increasingly common (Adamsa *et al.*, 2008). In the last three decades, a range of economic valuation methods for ecosystem services has been developed to determine their values via people's preferences as expressed e.g., by willingness to pay (WTP; Hein, 2007; Walsh, 1986). One important approach is the Contingent Valuation Method (CVM). The CVM has been commonly used as one standard approach to measure and quantify the non-market goods and the non-use values of an ecosystem in monetary terms, such as recreation resources, wildlife, and environmental quality goods (Hanemann *et al.*,

1991; Hanemann, 1994; Hein, 2007). It is also important for researchers to choose a realistic payment option in a CVM. This option represents a WTP scenario posed to the respondents. The payment vehicle may have included an entrance fee, sales tax, electric bills, license fees, or a special fund; but entrance fees were selected as the most logical choice and a realistic payment vehicle for users at recreation sites (Forster, 1989; Randall *et al.*, 1974). Furthermore, the entrance fee to a recreation site provides a more concrete contingency factor than others commonly used in the CVM studies, especially in environmental quality improvements or existence values (Lee and Chun, 1999; Jorgensen *et al.*, 2001; Turpie, 2003).

Tourism and recreation will increasingly use Pas and other nature areas, "in developed countries as buffer zones from daily urban life and in developing countries as the setting for nature tourism" (Font and Tribe, 2000). Based on the most commonly used definition, ecotourism or nature-based tourism is "responsible travel to natural areas that conserves the environment and improves the well-being of local people" (LINDBERG AND HAWKINS, 1993), a definition which emphasizes the view that ecotourism should have positive impacts. However, to realize this potential, the ecotourism experience and view must be identified to guide management actions and thus to sustain the resources on which ecotourism ultimately depends. In this way, in order for tourism businesses to succeed (Leco *et al.*, 2013), visitors are at the centre of ecotourism management. They represent a valuable resource for gaining information about the presence and extent of impacts, the acceptability of environmental change, and the consequences of management actions for conservation and their experience.

The past decade has seen a substantial move toward using education, information, and voluntary cooperation not just with individuals, but also with communities (NRC, 2002). In addition, policies based on voluntary agreements normally are presented as a way to reduce environmental impact faster or further than regulations require, especially when considering women power (e.g., NRC, 2002; Stern *et al.*, 1993).

Growth in population and climate warming over the past few years has caused serious degradation of natural reserves and biodiversity in Iran (Kolahi *et al.*, 2012). This has raised concern over the status of biological endemics species. In an attempt to preserve biodiversity (species, ecosystems and genes), some areas were converted into Pas. The Department of the Environment (DoE) is the top policy and decision-making governmental organization for the protection and management of Iran's Pas. Iran has four categories

of Pas including 'National Park', 'National Natural Monument', 'Wildlife Refuge', and 'Protected Area', which altogether cover about 10% of the total Iran's area (DoE-GIS, 2011). These sites are spread through the country. They host key habitats for an array of species and associated ecosystems and play a key role in the sustainable utilization and attainment of natural resources. According to the IUCN (1992), national park is the highest conservation status that can be conferred on a protected area. About 12 per cent of Iran's Pas are named as national parks (NPs; DoE-GIS, 2011). The level and the challenges of Iran's Pas management are noted by Kolahi et al. (2012). The Pas lack management plans. They are challenging with mismanagement, limited public participation, and conflict between people and other organizations over Pas. Only 2 % of the country's areas are effectively protected. On the other hand, these areas completely depend on a low, annual governmental budget, and in absence of economic analyses, all Pas have not optimized their income from Pas use (Kolahi et al., 2012). Some reports also showed that Pas managers considered community as a threat and they did not try to give opportunity to the public to cooperate in conservation activities (Kolahi et al., 2011).

There is a lack of reliable data specifically on ecotourism numbers to Iran and very little information exists regarding the environmental (biophysical and social) impacts of visitor activities and the effect of these impacts on the visitors experiences. Based on an inquiry from BHPAs (2013), the total eco-tourists of Iran's NPs have been estimated at 100,000 persons per year. However, ecotourism has a great future and there is a huge potential for the development of ecotourism in Iran's nature.

It is clear from the literature that one key to effective management of Pas is to consider the importance of social capital in biodiversity conservation, and to find accurate information of people view about managerial behaviour and cooperation. However, the main objective of this paper is to examine the Iranian e-society attitudes and capital towards the NPs and biodiversity conservation management. Furthermore, it carries out an economic valuation of the NPs; evaluates environmental awareness and activities; and presents and discusses scientific evidence on the efficacy of education, information, and voluntary measures for achieving environmental protection objectives.

## MATERIALS & METHODS

We have selected Iran's NPs and conservation management, and Iran's e-society as the case studies. An online questionnaire was administered to Iran's e-

society between July and September of 2012 to collect checked responses to primarily closed-ended questions. The questions were about the NPs and biodiversity conservation in Iran. They were designed so that all participants could answer them. But, those who had visited at least one of Iran's NPs had been asked some more related questions than others. These questions were divided into eight sections: 1) environmental activities and attitudes; 2) conditions of NPs and other PAs; 3) conservation awareness; 4) the relationship between local people and ecotourism; 5) volunteer measures; 6) satisfaction; 7) WTP; and 8) demographic information. The survey consisted of multiple-choice, dichotomous yes/no, and ordered-rank responses, though a few open-ended questions were also posed to offer further explanations for checked responses.

After the questionnaire was structured and standardized, Iranians were informed by emails and ads (in some web sites). In a few days, for example, an email was sent to more than 3,000 collected emails of Iranian people. Sometimes we also received emails which senders had enthusiastically circulated to their friends. However, this self-administrated questionnaire was given to people to complete it. We did not seek to represent objectively the opinion of most the Iranian public but to investigate the opinion of Iran's e-society. In this questionnaire, near 54 questions were asked. A total of 2,121 usable answers were finally collected from the survey. In this paper only the results of the common questions, for who visited Iran's NPs or not, have been presented. Data cleaning, checking and coding were done, then we performed analyses.

In this study, we designed the CVM to simulate as closely as possible a real market. We designed bids based upon the three previous studies (Kolahi et al., 2013; Qorbani and Sadeghi, 2011; Amirnejad, 2007) and inflation, and using entrance fee as a familiar vehicle for payment. It was felt that respondents would have little trouble visualizing the contingent market specified, since Iranian people are familiar with paying entrance fees for activities at recreation sites and many local facilities actually charge entrance fees. In this way, respondents had a real-world baseline to base their responses. A set of six different offers and an open-end offer were selected. The offers included *nothing*, *10,000*, *20,000*, *30,000*, *40,000*, *50,000 (Rials; US\$ 1=12,260 Rials; CBI, 2012)*, and *others (?)*; where maximum WTP for entrance fee was asked to visitors to the NPs to be spending on their protection and management. In the open-ended bid format (*others (?)*) respondents were asked to state directly their maximum WTP.

We used logit regression to model the relationship of the binary dependent variables (WTP yes/no, and willingness to voluntarily participate) to the independent variables by using the Conditional Backward method. A statistical summary and explanation of all variables included in the logit models are provided in Table 1. It is hypothesized that respondents who are older, who are male, who are single, who have a smaller family size, who have higher levels of education, who are field related to environment, who are members of environmental organizations, who and who's family earn more income, and who have visited at least one of the NPs would be willing to pay higher fees and to voluntarily participate in projects related to nature, environment, and biodiversity conservation.

It is assumed that an individual will accept a suggested admission fee for recreation activities (or a suggested tax for preservation), to maximize her/his utility under the following condition (Hanemann, 1984):

$$v(1, Y - A; S) + \varepsilon_1 \geq v(0, Y; S) + \varepsilon_0 \quad (1)$$

and reject it otherwise. Here,  $v$  is the indirect utility which is assumed to equal the utility  $u$ ;  $Y$  is income,  $A$  is an offer (admission fee or tax),  $S$  is other socio-economic characteristics affecting individual preference, and  $\varepsilon_0$  and  $\varepsilon_1$  are the identically, independently distributed random variables with zero means.

The utility difference ( $\Delta v$ ) can be described as follows:

$$\Delta v = v(1, Y - A; S) - v(0, Y; S) + (\varepsilon_1 - \varepsilon_0) \quad (2)$$

The CVM has a binary choice dependent variable which requires a qualitative choice model. The probit and logit models are commonly used qualitative choice methods (Capps and Cramer, 1985). Because of its relative simplicity to compute, the logit model is used in this research. The probability ( $P_i$ ) that the individual will accept an offer ( $A$ ) can be expressed as the following logit model (Pindyck and Rubinfeld, 1981; Hanemann, 1989):

$$P_i = F_{\eta}(\Delta v) = \frac{1}{1 + \exp^{-\Delta v}} = \frac{1}{1 + \exp^{-(\alpha + \beta A + \gamma Y + \theta S)}} \quad (3)$$

where  $F_{\eta}(\Delta v)$  is the cumulative distribution function of a standard logistic variate and some of socio-economic variables are included in this research.

$\beta$ ,  $\gamma$ , and  $\theta$  are coefficients to be estimated.

Three methods are usually used to compute the value of WTP: the first method, called mean WTP is to calculate the expected value of WTP by numerical integration, ranging from 0 to “; the second method, called overall mean WTP is to calculate the expected value of WTP by numerical integration, ranging from -” to +”; and the third method, called truncated mean WTP, is to calculate the expected value of WTP by numerical integration, ranging from 0 to Maximum Bid ( $A$ ). The last method is preferable because it satisfies consistency with theoretical constraints, statistical efficiency, and ability to be aggregated (Duffield and Patterson, 1991). Thus, the truncated mean WTP is used in this research.

**Table 1. A summary of variables used in all Logit Regression Models**

Variables	Description	Mean±SD
Age	Ratio scale: respondents were asked to write their actual ages based on calendar years.	31.5±8.11
Gender	Binary scale: males=1 and females=0.	0.55±0.50
Marital Status	Binary scale: single=1 and married=0.	0.45±0.50
Family size	Ratio scale: total number of people living in respondent's household.	3.77±1.50
Education	Ordinal scale (1 to 6): Under high school=1, high school=2, Associated degree=3, Bachelor=4, Master=5, Doctor and upper=6.	4.70±1.01
Field related	Binary scale: field related to environment, natural resources or similar issues=1, otherwise=0	0.42±0.49
Member	Binary scale: a member of any environmental supported organization=1, otherwise=0	0.23±0.42
Visited	Binary scale: visited an Iran's national park =1 and not visited=0.	0.62±0.49
Monthly income (Rials)	Ordinal scale (0 to 6): Nothing(0), less than 5,000,000(1), 5,000,000-7,500,000(2), 7,500,000-10,000,000(3), 10,000,000-15,000,000(4), 15,000,000-20,000,000(5), over(6)	2.38±1.88
Family monthly income (Rials)	Ordinal scale (0 to 6): Nothing(0), less than 5,000,000(1), 5,000,000-10,000,000(2), 10,000,000-15,000,000(3), 15,000,000-20,000,000(4), 20,000,000-25,000,000(5), over(6)	3.39±1.61

The logit model in Eq. (3) is then estimated using the maximum likelihood estimation method, the most common technique for estimating the logit model (Capps and Cramer, 1985). Once the parameters have been estimated using the maximum likelihood method, then the expected value of WTP can be calculated by numerical integration, ranging from 0 to Maximum Bid (A) as follows:

$$E(WTP) = \int_0^{MaxA} F_{\eta}(\Delta v) dA = \int_0^{MaxA} \frac{1}{1 + e^{-(\alpha^* + \beta A)}} dA \tag{4}$$

$$\alpha^* = \alpha + \gamma Y + \theta S$$

The area under the curve in Eq. (4) can also be used to make inferences of truncated mean of WTP.

**RESULTS & DISCUSSION**

Out of 2,121 respondents, 61.7% had at least visited one of Iran’s NPs (Table 1). 0.4% of answers lived inside the NPs. But 9.0%, 19.9%, 41.4%, and 29.3% mentioned the distance of a nearest national park to their living cities in Iran were less than 10, 10-50, more than 50 km, or they did not know, respectively. 96.4% confirmed that their income or part of that did not depend on NPs.

1.9% of them were 19 and under, while 46.0%, 37.0%, 10.9%, 3.4%, 0.8%, and 0.0% were among 20-29, 30-39, 40-49, 50-59, 60-69, and 70 old and more, respectively. Some respondents mentioned their primary job as teachers (elementary to university; 21.1%), student (21.5%), private company employee (12.6%), liberal expert (doctors, judges, lawyers, deputies, artists, writers, etc.; 12.0%), and government employee (10.9%). But others noted their primary jobs as farmer/ranchman (0.6%), housekeeper (7.0%), self employment (3.6%), retired (2.7%), part-time job (2.5%), unemployed (3.1%), and other (2.4%). About 0.9% of responders did not complete high school, 3.3% completed high school, 4.3% had the associate degrees, 28.1% had the bachelor degrees, 43.0% had the master degrees, and

20.4% had the doctorate degrees or upper. Respondents mentioned their monthly income into the following brackets (Rials; US\$ 1=12,260 Rials, CBI 2012): zero (19.0%), less than 5,000,000 (20.5%), 5,000,000 - 7,500,000 (17.7%), 7,500,000 - 10,000,000 (13.9%), 10,000,000 - 15,000,000 (11.1%), 15,000,000 - 20,000,000 (10.4%), and more than 20,000,000 (7.4%). They also noted their family monthly income into the following brackets (Rials): zero (2.6%), less than 5,000,000 (5.7%), 5,000,000 - 10,000,000 (27.3%), 10,000,000 - 15,000,000 (21.6%), 15,000,000 - 20,000,000 (15.4%), 20,000,000 - 25,000,000 (12.7%), and more than 25,000,000 (14.8%). The sample represented visitors from all 31 Iran’s provinces where the most common were Tehran (43.5%), Khorasan Razavi (8.1%), Isfahan (7.0%), Mazandaran (4.1%), Fars (3.9%), Alborz (3.4%) and Khuzestan (2.7%). As these provinces are the most populated provinces in Iran (SCI, 2011), so it is expected to have these percentages. Finally, 88.4% of respondents were living in Iran, while 11.6% were living abroad.

56.0% of responders believed co-management as the more suitable structure for Iran’s NPs management system, others noted private management (28.6%), governmental management (6.4%), or they do not know (9.0%), as their answers. Table 2 summarizes some of the respondents’ environmental activities and attitudes. The frequency distribution of the respondents’ perception variables on environmental issues, local people, ecotourism, and NPs management are shown in Table 3. Awareness of the respondents about biodiversity conservation and NPs are also presented in Table 4.

23% of respondents commented in the last open-end question. Almost all the respondents worried about the destruction of Iran’s nature and the reduction of biodiversity. The comments contained a lot of useful information about threats to Iran’s ecological regions. The main threats are grouped in four items including 1) mismanagement and lack of support from the

**Table 2. Environmental activities and attitudes**

Statements	%	
	No	Yes
Voluntarily participated in any activities related to nature conservation and environmental protection?	54.1	45.9
Willingness to voluntarily participate in some projects related to nature conservation and environmental protection?	10.9	89.1
Dependence of income or a part of that on national parks?	96.4	3.6
Participated in any projects of national parks planning and management including meetings, enforcement and/or monitoring?	77.9	22.1
WTP money as entrance fee for spending on the national parks conservation activities	6.5	93.5
Willingness to visit Iran’s national parks in future?	1.2	98.8

**Table 3. Frequency distribution of perception variables**

Statements	Rate of agreement (%)				
	SD	D	N	A	SA
Local people economically benefit from ecotourism activities.	3.5	11.1	7.6	44.7	33.0
Everyone should conserve wildlife of national parks.	0.9	1.0	0.8	11.9	85.4
Government should allow stakeholders to participate in management of national parks.	3.3	12.4	11.8	35.6	36.8
There is trust between national parks administrators and local people.	13.4	36.9	30.3	13.6	5.8
Current preservation and management activities in national parks are successful in conserving Iran's natural areas and wildlife.	23.6	36.9	21.1	15.0	3.5
Local people like establishing of national parks.	3.9	15.0	38.9	30.1	12.1
Ecotourism activities contribute to conserve national parks and their biodiversity.	9.2	26.7	14.4	33.5	16.1

**Table 4. Knowledge about biodiversity conservation and national parks**

Statements (knowing of/agreement)	%	
	No	Yes
National parks may include private lands and some people are living in.	46.6	53.4
National parks are scenic outstanding areas of natural landscape which would be sufficient to represent the nature of our country.	23.3	76.7
The purposes of designing a national park are "protection and improvement of biodiversity and sites" and "recreation".	28.7	71.3
About 1% of the country is selected as national parks.	77.7	22.3
All countries have confirmed to increase their PAs at least to 17% of their country's area by 2020 at the last international convention in Nagoya (2010).	92.0	8.0
About 10% of Iran's land has been progressively selected as PAs.	81.7	18.3
To increase the percentage of PAs to conserve Iran's biodiversity.	3.6	96.4

Government, the Legislature and the Judicature (48%); 2) lack of people's cooperation in environmental issues (29%); and 3) lack of knowledge and information related to biodiversity, NPs, environmental impacts, NGOs, and conservation activities (21%); and others (e.g., insufficient law; 2%).

Almost 73% (1,547) of respondents wrote their email address in the questionnaire to receive the results of this research. 5% asked to know about environmental active NGOs. Finally, 10% were grateful and wrote they had found this survey to be a bridge to learning more about the NPs and conservation.

Almost 94% of the respondents were willing to pay the bid amount specified in the survey (Table 2). The logit regression model was robust in fitting the data which almost 93.5% of respondents were correctly allocated to predicted WTP either 'yes' or 'no' in the model, indicating a relatively good-fit to the data ( $\chi^2_8=25.88, p<0.001$ , Table 5). Of the 10 variables (Table 1), three were significant predictors of WTP in our model: marital status, member of environmental organization, and respondents' family monthly income with the expected positive sign. The estimated

coefficient of the respondents' family monthly income was statistically significant at 99 percent confidence. The coefficients of marital status and membership with an environmental organization were also statistically significant but at 90 percent confidence. Their signs were also positive. These indicate that the probability of WTP 'yes' increases for who is married, who is a member of environmental groups, and whose family earns more income, under the hypothetical market scenario. Variables of age, gender, education, the family size, field related, experienced at least one of Iran's NPs, and respondent' monthly more income were excluded by the model, though these variables did not explain significant variations in WTP. While respondents who were older, male, more educated, active in ecotourism, smaller family size, field related, and higher individual monthly income, were more likely to be willing to pay, their predictive ability was overpowered by the other variables in the study.

The majority of the respondents were willing to voluntarily participate in projects related to nature conservation and environmental protection (Table 2). The logit regression model was robust in fitting the data which almost 89.1% of respondents were correctly

**Table 5. Results of the logit model for WTP of Iran’s national parks**

Explanatory variable	Coefficient	Std. error	Sig.
Marital status	0.341	0.185	0.066
Member of environmental organization	0.421	0.235	0.074
Respondents’ family monthly income	0.233	0.059	0.000
Constant	1.717	0.199	0.000
Likelihood-ratio $\chi^2_8=25.88$ , $p<0.001$ , $N=2,121$ , $-2 \log$ likelihood: 995.08			
Correctly classified: 93.5%			

**Table 6. Results of the logit model for willingness to voluntarily participate**

Explanatory variable	Coefficient	Std. error	Sig.
Gender	-.452	.148	.002
Marital status	-.364	.144	.011
Field related	.725	.166	.000
Member of environmental organization	1.309	.271	.000
Constant	2.110	.137	.000
Likelihood-ratio $\chi^2_7=86.43$ , $p<0.001$ , $N=2,121$ , $-2 \log$ likelihood: 1373.81			
Correctly classified: 89.1%			

allocated to predicted willingness to voluntarily participate either ‘yes’ or ‘no’ in the model, indicating a relatively good-fit to the data ( $\chi^2_7=86.43$ ,  $p<0.001$ , Table 6). Of the 10 variables (Table 1), four were significant predictors of willingness to voluntarily participate in our model: gender, marital status, field related and member of environmental organizations. The estimated coefficient of gender, field related and member of environmental organization were statistically significant at 99 percent confidence. The coefficient of marital status was also statistically significant but at 95 percent confidence. The signs of field related and member of environmental organization variables were positive as expected. But the signs of gender and marital status variables were negative. These indicate that the probability of willingness to voluntarily participate ‘yes’ increases for those who are female, single, whose field is related to environmental issues, and who is a member of environmental groups, under the hypothetical market scenario. Variables of age, education, the family size, experience at least one of Iran’s NPs, and more income were excluded by the model, though these variables did not explain significant variations in willingness to voluntarily participate. While respondents who were older, more educated, smaller family size, active in ecotourism, and higher individual and family monthly income, were more likely to be willingness to voluntarily participate, their predictive ability was overpowered by the other variables in the study.

Equation (5) shows the expected value of truncated mean WTP, which represents use values of Iran’s NPs. It was calculated by numerical integration, ranging from

zero to Maximum Bid (see Eq. (4)) after parameters from WTP logit model were estimated using the maximum likelihood method. The socioeconomic term of  $\theta$  was estimated and added to an adjusted intercept together with the original intercept term of  $\alpha$ . Iran’s NPs, in general, were estimated to have the highest use value of 49,905 Rials (approximately US\$ 4; CBI 2012) per visitor.

$$E(WTP) = \int_0^{50,000} \frac{1}{1 + e^{-(-8.907 + 0.094A)}} dA = 49,905$$

Rials (US\$ 4) (5)

The number and scale of threats to Iran’s ecological regions create an extremely difficult task for protection. However, the results of the survey can be discussed based on following five items: management problems, environmental educational programs, environmental volunteer plans, ecotourism tour packages, and co-management and community-based conservation. For Iran’s government to meet targets and goals for effective management in conservation, a focus on all of these elements is required.

Some reports mentioned better conditions for Iran’s PAs compared to unprotected areas (e.g., IFNRCBD, 2010). But the respondents claimed that PAs are also under pressure from anthropogenic activities and lack proper management and maintenance. In many cases, poaching and biodiversity loss continue; forests are harvested and clear-cut, air is polluted, soils are eroded, watersheds

are degraded, more and more fertile land is lost to desertification, and vital ecosystem processes are disturbed. However, Iran's PAs are threatened with mismanagement; conservation-other organizations conflict; conservation-people conflict; lack of sufficient and implementing environmental laws; unplanned ecotourism; and lack of community-based conservation projects.

The majority of respondents noted that current preservation and management activities were not successful in conserving natural areas and biodiversity (Table 3). They worried about the future of Iran's biodiversity and habitats. The opinion of most responders clearly was that the current structure of governmental management of NPs should be changed to a better structure (84.6%). The country's biodiversity, much of which is found in PAs, has diminished together with habitat areas. On the other hand, the DoE at the national, provincial and PAs levels are unable to engage on equal terms with other government sectors and remain weak actors, because of the lack of support from the Government, the Legislature and the Judicature. These findings are similar to UNDP-GEF (2004). This lack of coordination between government agencies and conflicting policies hinders biodiversity conservation. Kolahi et al. (2012) presents important problems and challenges in Iran's biodiversity conservation. Almost all PAs are managed without management plans. They are challenged with untrained managers; unscientific actions; insufficient staff and ecoguard; budget constraints; lack of scientific planning; weak monitoring and control programs, and lack of an effective relationship with national and international environmental organizations. Most PAs are not demarcated, and without clear boundaries. Some are with no ranger office. Some responders claimed that the managers do not give much support for environmental publications, NGOs, experts, and conservation volunteers. Furthermore, some respondents noted unequal equipments and salary for all managers and ecoguards across country. The ecoguards are mostly temporary, poor, uneducated, with low equipments for defence, low salary, and sometimes unpaid salary for some months (see e.g., Darvish, 2013a). Some rangers avoid fighting with illegal hunters, because of the lack of supports from managers. Unfortunately, it is reported that some of them collaborate with illegal hunters. On the other hand, the DoE issues many legal permits to hunt wildlife every year, which mostly these permits are not based on the wildlife survey, and hunters are not well controlled (see e.g., Kehsvari, 2013; Darvish 2013b).

Iran has both a lack of sufficient environmental laws and a severe lack of implementation of existing

laws. The current patchwork legislation is weak and sometimes focused on particular species or types of organisms rather than on habitats. A more critical problem is that enforcement of conservation legislation is weak, and illegal hunting, logging, and land encroachment in PAs is common. In addition, the Iranian government, practically unopposed, can easily modify existing environmental laws and pass new ones to remove environmental obstacles to the construction of roads, dams, mines, factories, housing projects, and other developments. As a result, some respondents believed and some reports noted sustainable development is a motto, and the DoE is a paper organization. Subsequently, the PAs are paper areas. As long as laws are insufficient and poorly enforced, penalties are small and often not implemented, public education and awareness of existing environmental standards and regulations are limited, and poverty and unemployment are not decreasing, environmental degradation will continue and effective management will be limited. However, when the speed of degradation of the realm's biodiversity is at least 166% greater than the global average (Darvish, 2006), and all Iran's environmental alarm lights are red (Kolahi et al., 2012), the government must quickly act and carefully improve its conservation efforts.

Public awareness and collaboration for environmental issues is very low which create a big conflict in these issues. The environment is not yet thought to be an important problem compared with other socioeconomic issues. These findings are similar to Calabrese et al. (2008). People are uneducated and uninformed about environmental impacts (Abdollahi, 2012), or how to behave with nature, even with their garbage. Unfortunately, most often, they leave their garbage in visited areas. Biodiversity conservation suffers from the perception of the Iranian public that personal actions do not cause biodiversity problems, so there is a need to adjust the public's perception of biodiversity. In addition, most people have a low income, and cannot travel more to see natural lands. They can only visit some nearby city parks. Furthermore, there is a lack of understanding of the concept of NPs, other PAs, biodiversity, wildlife, and conservation. Many, even some of the educated and major decision-makers, do not know the difference between "city parks" and "national parks". There are no education programs especially from schools. There is no continuation of worthy publications, such as books, journals, and newspapers, about biodiversity, conservation, NGOs, and the NPs and other PAs. Hunting problems continue to exist due to a lack of sufficient awareness and ongoing cultural issues of indigenous people. However, there is a big gap in



building capacity of the public which some respondents believed that the government is not intentionally willing to dedicate resources to educate the people about environmental issues. Therefore, it raises the conflict and this lack of coordination hinders biodiversity conservation. However, public education and awareness of the ongoing crisis in Iran's ecosystems remains low, hampering the ability of well-intentioned decision-makers to implement positive changes with regard to conservation policies.

In TV and newspapers, except for a few efforts, there is not much discussion of water, air, PAs, endangered species, or habitat loss. Even climate change and renewable energy have thus far received scant attention. Framing the biodiversity issue for the society is a critical component for successful conservation. The managers should elevate Iran's environmental awareness and consciousness, build community capacity for biodiversity management, create a robust conservation movement, promote ecotourism and sustainable investment, and strengthen the capacity of NGOs. Village and urban areas need to have nature centres and schools with environmental education programs that contribute to a conservation ethic to adequately increase the political value of biodiversity. For example, a director of a school in Iran was so happy from the results of intensively his setting up a class about environmental issues for 350 students of the school (Borbor, 2013). Furthermore, some attractive programs should be designed such as junior rangers to allow elementary and secondary school children to patrol PAs, carry out simple surveys of fauna and flora, and acquire other experiences made possible by the guidance and cooperation provided by PAs rangers and volunteers. In support of stewardship, a systematic program as posting adopt-a-species signs to engage the public empathy for endangered species might foster strong collective action responses (Schwartz, 2006). Having more space in media (e.g. TV, radio, etc.) reserved for environmental education will also benefit protection. Creating a biodiversity ethic, however, requires changing the perception of distant biodiversity loss into one in which people all share personal responsibility, locally and globally.

More than half of responders had voluntarily participated in activities related to nature conservation and environmental protection (Table 2). People completely interested in conserving nature areas and biodiversity with the high agreement to increase the percentage of the PAs (Table 4). Respondents believed that the conservation of biodiversity is not only the responsibility of the government but also others (Table 3). Although about one-third had participated at least

in a project of NPs planning and management including meetings, enforcement and/or monitoring, the majority of responders were willing voluntarily to participate in projects related to environmental issues and conservation (Table 2). They think ecological problems and solutions are human problems and not simply biological problems. On the other hand, many want to voluntarily participate in environmental projects, but do not know where and how. Based on the results of the logistic model (Table 6), who had field related and were a member of any environmental supportive organization, were more willingness to voluntarily participate, as expected, which it is a point for managers to engage their knowledge and efforts in conservation. Women and single persons were also more willing to join (Table 6). However, volunteer stewardship programs are an important way to engage the society (Schwartz, 2006), yet relatively a few organized efforts exist.

Ecotourism potentially provides a sustainable approach to tourism development across the world. PAs and other nature areas in Iran and across the world are considered special places that have come to be regarded as natural and cultural assets attracting many local, national and international tourists (Darvishsefat, 2006; Moore *et al.*, 2009). Iran's NPs have two primary objectives - protect conservation values and to provide a means for people to visit and enjoy the parks to the fullest extent - as long as the conservation values are retained. That is sometimes a fine balance that needs to be reassessed and adjusted periodically. Although, visitors in PAs can generate both positive and negative environmental impacts (McCool, 2006), some efforts show that through developing sustainable ecotourism it can be possible to change attitudes and increase conservation (e.g., UNWTO, 2012).

The survey results showed that almost all respondents were willing to pay for biodiversity protection (Table 2). The probability of paying more is also subject to increase if responders were married, were a member of any environmental supportive organization, and their family earn more income (Table 5). In addition, most answerers highlighted ecotourism activities as a tool to benefit local people via spending money, educating, etc (Table 3). The proportion of respondents who reported a desire to visit NPs of Iran in the future was high (98.8%; Table 2). But Iran's NPs and other PAs lack ecotourism plans. Their recreation zones are not designed. Most areas do not have initial infrastructure and service facilities. Efforts to attract ecotourism are limited. Except a few agencies, no scientific and recreation tours are planned. On the other hand, there is not any statistical documentary about eco-tourists in Iran's NPs and other PAs. And, most of ecotourism activities are unplanned and uncontrolled.

A wide array of options should be available to those who wish to interact with nature. These options can include mountain climbing, hiking, skiing, camping, canoeing, snorkelling, birdwatching, and nature-observation activities. In order to allow these activities to be enjoyed by many people, visitor centres, pedestrian walkways, and guide signs should be erected or installed and guided tour and other events should regularly held. Furthermore, a program to provide assistance to cover the costs of building mountain hut lavatories should be planned in response to the environmental problems of trash and human waste occurring in natural areas.

The relationship between nature conservation and ecotourism can be classified into three categories: coexistence, conflict, and symbiosis (Budowski, 1976). The survey results showed that there is a potential symbiosis relationship between Iran's NPs conservation and ecotourism whereby environment protection can be enhanced by ecotourism because of the advantages of interactions between conservationists and the ecotourism industry. However, well-managed ecotourism can help biodiversity protection.

Unfortunately, there is no statistical documentary about eco-tourists in Iran's NPs. This number has been estimated very low (BHPAs, 2013), only 100,000 persons per year, mostly because of the lack of the basic infrastructural facilities and information. In addition, the set-up of new payment schemes for economic services is one of the sensitive issues, since these schemes are unlikely to be successful when people are poor and it is hard to pay for the ecosystem services they receive (Hein, 2007). Therefore, we do not follow to apply an entrance fee, but it is suggested here that the government should think more about tour packages as a rational method to aware and take support from the public. However, ecotourism has a great future and there is a huge potential for the development of ecotourism in Iran's nature. And, there are opportunities for increased productivity from ecotourism which can deliver economic benefits for the sustainable management of the NPs and local communities.

The spatial coincidence of people and biodiversity poses a problem for conservation biologists, but also provides an opportunity (Schwartz, 2006). As Pretty and Smith (2004, p632) reported, there is growing evidence "to show that when people are well connected in groups and networks, and when their knowledge is sought, incorporated, and built upon during planning and implementation of conservation and development activities, then they are more likely to sustain stewardship and protection over the long term".

Rosenzweig (2003) presents several successful examples of involving people efforts in biodiversity conservation. However, linking social capital lowers the costs of working together and it facilitates participation (Pretty and Smith, 2004).

The majority of the responders pointed out that the current governmental management structure of the NPs needs to be changed to a better one, where the most frequently mentioned co-management structure as the best structure. They believed that government authorities should allow them to participate in conservation management (Table 2). Respondents wanted that their voices would be heard and be a part of the process. On the other hand, the local capital is important in real conservation. There is no organized cooperation between local people and conservation. There is a lack of real community participation, a lack of indigenous community conserved area, and no place for community-based conservation. Some integrated management projects also lack the supports from the national and the international organizations (Yakhkeshi, 2006). On the other hand, trust between management and local people is limited (Table 3). This finding is similar to Nouri (2008), Yakhkeshi (2006), Torabi (2004), and Sheikhpour (2009), which it may result from the lack of environmental awareness, low education levels, or economic poverty. Local level projects do not build community capacity for biodiversity management. However, the possibility of finding effective ways to manage the parks is needed. The power of the people for conservation should be the main way in the conservation. Iran needs to create more opportunities to engage the public in conservation science. All stakeholders, especially local communities, scientific communities, local authorities and international stakeholders should be a basic principle of management of the PAs. An alternative livelihood program and local participation should be included in PAs management plans, with an emphasis on activities that do not compromise biodiversity (Fuller 2004). Conservation biologists can help to resurrect biodiversity ethic by supporting science that better integrates the public into the process of understanding human impacts on biodiversity. It is also important to focus on conservation projects that engage people in the stewardship of biodiversity. Without the availability of legal activities that result in tangible monetary benefits for local people, illegal activities and overuse of protected resources will continue, and community conflicts will increase (Kudat et al. 1999; Fuller 2004). The managers, however, have to think about mechanisms to help increase public participation by building opportunities for participatory, cooperative science and stewardship. For drawing collaboration framework, the managers can establish it with some

important principles that the real collaborative actions should follow, such as principles of equality, respecting voluntary actions, developing independent actions, mutual understanding, sharing objectives, and transparency (RACG, 2010). Then the public can share adequate benefits with the NPs management.

## CONCLUSION

There is a resurgent interest in conservation in the Iranian citizen scientists. This provided a venue for this paper to conduct research relevant to decision making and builds social capital. Furthermore, conservationists could become more mindful of opportunities to work on multiple goals of conservation that include building public support. It was felt that management and ecotourism in Iran's biodiversity conservation could be sustainable if the managers were equipped with sufficient information from the public. Informed decision making and sound management of the site and facilities would help, in the long term, to sustain biodiversity, management, and economic benefits of ecotourism in Iran's NPs. This study, with its socio-political approach, contributed to a greater understanding of the implications of Iran's e-society opinions for PAs management in Iran. With human population growth, mismanagement and poverty, undoubtedly threats to biodiversity will not be abated easily. NPs and biodiversity conservation in Iran have been threatened by mismanagement, lack of funds, park-people conflict, park-other organization conflict, lack of biodiversity awareness, and lack of public participation. The current governmental management structure is not successful in the conservation. It was thought that PAs in Iran are "paper PAs". The government must quickly act and carefully improve its management activities. Biodiversity conservation efforts have to be prioritized. The governor must focus on conservation projects that engage the urban populace and support the goal of developing a biodiversity ethic. It should consider updating management, enhancing environmental educational programs, designing environmental volunteer plans, treating ecotourism tour packages, and establishing co-management and community-based sustainable conservation. For Iran's government to meet targets and goals for effective management in conservation, a focus on all of these elements is required.

People should be seen not as a threat but as an opportunity to help achieve broader nature conservation goals. The government should see the human and environmental condition as one intricate system. Although the NPs managers have the problem in participatory management, volunteer conservationists are also losing the battle to protect nature because they are failing to connect with the

hearts, anxieties, and minds of a large segment of the Iranian public. If Iran's environmentalists are to move beyond their current isolation, they must reach out and connect to new audiences across the social spectra. However, conservation biologists can help engage Iran's society in conservation efforts by striving to achieve three goals: adjusting the public's perception of biodiversity, increasing public participation in biodiversity conservation, and encouraging ecotourism by tour packages to develop conservation and local.

Almost all respondents were willing to voluntarily participate in projects related to nature, environment, and biodiversity conservation; willing to pay for protection; willing to increase the percentage of PAs; willing to visit the NPs in the future; and they were mostly young. But these opportunities are less considering. For example, volunteer stewardship programs are missed opportunities. Volunteers can be registered with each national park and be engaged in providing nature interpretation programs, participating in clean-up operations, undertaking simple repairs of facilities, carrying out nature surveys, and otherwise doing whatever they are capable of doing to support natural parks. However, NPs volunteers and others can provide support for certain aspects of NPs managements.

The task of privatizing nature in Iran's conditions seems daunting, but there is much encouragement to have co-management (join management). This is why most of the respondents confirmed that co-management is a reasonable structure for Iran's NPs. Although, there is a persistent challenge to effectively engage people in the job of protecting biodiversity (Schwartz, 2006), it consequently depends on the government's responsibilities to successfully apply co-management between NPs administrations and people. The governor, however, should look for synergisms; to find ways to meld conservation work with the Iranian public's interests and day-to-day lives. Many studies in the past used the direct face-to-face interview as their main survey method. We would like to see more online questionnaires in future for the evaluation of environmental problems.

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