ASSESSING THE PREFERENCES OF PLANT BREEDERS AND COMMUNITIES ADJACENT TO CONSERVATION AREAS FOR CONSERVATION OF GENETIC RESOURCES OF RICE WILD RELATIVES OF SRI LANKA

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ABSTRACT

This article assesses the preferences of plant breeders (n=30) from reputed institutions in Sri Lanka (e.g. RRDI, PGRC) and people (n = 50) in the communities adjacent to areas where Rice Wild Relatives (RWR) of Sri Lanka are reported extensively (e.g. Wavulpane village in Rathnapura district) towards the conservation and management of genetic resources of RWR. A multi-phased research program was carried out during March – September 2009, with Focus Group Discussions and Participatory Community Appraisal methods supported by structured questionnaires to collect data and use of Choice Experiment Models to analyze data. The results suggest that people in the adjacent community were willing-to-pay a significantly higher amount of money for in-situ conservation of RWR (i.e. Rs. 82 per month in the form of allocation of land and labor to support their livelihood) as compared to the value placed by the plant breeders (i.e. Rs. 10 per month), on an average. This highlights the rationale and importance of setting alternative institutional arrangements to design and execute appropriate policies and programs for this purpose with proper time-dimensions (i.e. short and long term) and directorial goals (i.e. CSR activities, profit making).

KEYWORDS: Biodiversity conservation, Choice experiment modeling, Economic valuation, Rice Wild Relatives

INTRODUCTION

The wild relatives of crop plants or Crop Wild Relatives (CWR) include the progenitors of crops as well as other species more or less closely related to them. Out of 415 CWR species identified in Sri Lanka, 239 are native while 83 species are found to be endemic. With regard to rice, there are 20 Rice Wild Relatives (RWR) found to exist globally. Five rice wild relatives have been identified in Sri Lanka, namely: (1) *Oryza nivara;* (2) *Oryza granulata;* (3) *Oryza rufipogan;* (4) *Oryza eichingeri,* and (5) *Oryza rhizomatis,* last of which is endemic to Sri Lanka. (Ilankoon and Wijesekara, 2008). These species constitute an increasingly important resource for improving agricultural production and increasing food security and are indispensible for maintaining sustainable agro-ecosystems.

Modern cultivars of most crops contain some genes that are derived from wild relatives. The gene sequences of RWR in different geographies differ. As the gene mappings of these have not still been done, in-situ conservation of the total RWR populations is warranted. It is known that *Oryza nivara* in Sri Lanka contains a Brown Plant Hopper (BPH) resistant gene. In addition *Oryza rufipogan* contains a flood tolerant genes and *Oryza granulate* is characterized by the drought tolerant genes. Further *Oryza rhizomatis* contains a rhizome and hence has the potential of being used to develop perennial rice. These suggest that with the advent of climate change and greater ecosystem instability CWR, in general, and RWR, in particular, have a potential to emerge as a critical resources in ensuring food security and nutrition.

Yet, the natural populations of many RWR in Sri Lanka are increasingly at risk at present. Economic forces drive much of the extinction of the native RWR and its genetic diversity. The RWR, for example, are being removed by farmers on the misidentification that they are weedy rice varieties and allowed for destruction through cattle grazing. The increasing industrialization of agriculture is reducing the occurrence of CWR within the traditional agro-ecosystems, especially in the arid and semi-arid regions of Sri Lanka.

The activities of genetic resources conservation itself generates economic value, which may well not be captured in the market place. The main economic reason for the erosion of RWR is, therefore, that there is an underlying disparity

between the private (financial) and social (economic) costs and benefits of use and conservation of RWR. Economic benefits from conserved areas tend to be limited to a local scale, increase somewhat on national scale and can be substantial on global scale. On the other hand, costs, in terms of forgone development opportunities, tend to be locally significant and nationally and globally moderate (Pearce and Moran, 1994; Wells, 1992).

Economic studies of the value of genetic enhancement have consistently demonstrated the higher utility and net gains to the society from the higher yields and better resistance to diseases. The literature on searching for valuable genetic enhancement is more conclusive and a majority of studies agree that economic benefits from searching for genetic resources either *in situ* or *ex situ* are positive compared with costs. The key variable is information. Application of prior information about the probability distribution of a desired trait or set of traits and where searches are likely to have the highest payoffs can significantly increase the economic value for genetic resources. It has been clearly established that conservation policies are better guided by the insights derived from economic analysis and the relative values of different groups who are interested in CWR conservation would guide policy makers on the best policy options to be adopted (Shogren *et al.*, 1999: Dawson and Shogren, 2001; Hanley *et al.*, 2003).

With this background, the purpose of this study was to understand why the RWR should be conserved and how should this be done through the estimation of the welfare effects such as the Marginal Willingness-To-Pay (WTP) of the people for an additional unit of attribute of a RWR conservation options. The study has two specific objectives; first, to examine empirically the choice and trade-offs of the researchers, breeders and expert scientists on rice on different RWR conservation options and provide an optional value for the RWR to be used in total economic valuation, and the second was to evaluate the public preferences for a RWR conservation program to derive the optimum economic value.

METHODOLOGY

The study was designed to have two phases to facilitate the collection and analysis of data from both rice breeders and researchers (Phase I) and the general public (Phase II). The analytical framework used and the measures taken in each phase to collect and analyze data are explored, in turn.

Analytical Framework Based on Choice Modeling

Choice Modeling (CM) is a research technique that belongs to the family of Stated Preference Methods in environmental valuation, where the information about preferences of decision makers are elicited using specifically designed questionnaire. The ability of this approach to decompose the values of environmental services into implicit values associated with particular attributes has made it attractive for economic analysis of environmental issues (Adamowicz *et al*., 1998). On this rationale, this study has used the choice methods to develop the analytical framework, which is based on the Random Utility Theory (McFadden, 1973).

To proceed with the analysis, a sequence of "choice sets" with key "attributes" that are specified at different "levels" is developed for this purpose and was included in a questionnaire . The respondents will, then, be asked to indicate their preferences on each choice set, which assumes that an individual chooses good "X" among a particular set of "Y" goods by taking into consideration the relative utilities derived from these goods.

Each alternative (*i*) in the choice set, thus, has an associated utility level represented by:

$$U_i = V_i + \varepsilon_i \qquad (1)$$

Where, U_i = utility generated by i^{th} alternative; V_i = objective component, and ε_i = error component. It is assumed that the utility for an option (*i*) depends on a vector of its observable attributes (Z) and a vector of the socio-economic characteristics, and environmental knowledge attitudes and perception of the respondents (S) as follows:

$$U_i = V_i (Z_i, S_i) + \varepsilon_i (Z_i, S_i) \qquad (2)$$

Selection of one option over another indicates that the utility of the option *i* (U*i*) is greater than the utility of the other option *j* (U*j*). However, since the overall utility is random, one can only analyze the probability of choice of one option

over another:

$$P\ \{i \text{ chosen}\} = P\ \{V_i + \varepsilon_i > V_j + \varepsilon_j\} \text{ in C, where C is the choice set} \quad (3)$$

The probability of an individual choosing an alternative *i* can, therefore, be written as the closed-form Multinomial Logit Regression (MNLR) (McFadden, 1973) such as:

$$P[i] = e^{vi} / \Sigma_{j\varepsilon c}\, e^{vj} \quad (4)$$

V*j* is assumed to be linear and additive functions in the attributes (Zs or Xs). Let *q* represent an individual and then V*j* can be written as:

$$Viq = \sum_{k=1}^{k} \beta_{jk} X_{jkq} \quad (5)$$

Where, β_{jk} = estimates of the weight of attribute *k* in the utility expression of V_j of alternative *j,* and V_{iq} = estimates of the (relative) utility U_{iq} of the individual.

Once the parameter estimates have been estimated, the Marginal Willingness-To-Pay (MWTP) that conforms to demand theory can be derived through:

$$MWTP = \beta_{jk} / \lambda\gamma \quad (6)$$

Where, $B_{j\kappa}$ = coefficients of a non-market attribute obtained above, and $\lambda\gamma$ = coefficients of the price attribute.

The value of a marginal change in any of the attributes can, thus, be expressed as the ratio of coefficients of any of the attribute and the MVTP ratios are often known as the implicit prices. The development stages of Multinomial Logit (MNL) model can be expressed as:

$$V_{iH} = {}_f(X_k, Z_{mH}, \varepsilon_H) \quad (7)$$

$$V_{iH} = ASC_H + \beta_k X_k + \alpha_{mH} Z_{mH} + \varepsilon_H \quad (8)$$

Where, V_{iH} = probability that the individual will choose the i^{th} option in the choice set; X_k = attributes of the RWR conservation option; Z_{mH} = characteristics of the individual interacted with the attribute of the RWR conservation option; ASC_H = alternative specific constant for individual; β_k = coefficient of the attributes (X_K); α_{mH} = coefficient of the Z_{mH} interacted with X_k; ε_H = error term.

Identification of Choice Alternatives

Focus Group Discussions with Rice Breeders and Researchers

As explained above, the initial step towards empirical analysis was to identify the "choice alternatives" and their relevant attributes. To accomplish this task, a series of Focus Group Discussions (FGD) were conducted with the researchers, rice breeders and senior scientists / administrators from the Rice Research and Development Institute (RRDI) at Bathalagoda, the Plant Genetic Resources Center (PGRC) at Peradeniya, District Secretariat Office and the Land Use Office in Puttalam, the International Union for Conservation of Nature (IUCN) Head Office and the Ministry of Environment and Natural Resources in Colombo and the Chemical Industries Colombo (CIC) Seed Farm at Palwehera in March 2009. At the end of these FGDs, the research team was able to select a set of five "*attributes*" (each comprising of three "*levels*") to be used with the rice breeders (Table 1) and another set of four "attributes" (each comprising of three "levels") to be used with the general public (Table 2).

Selection of Most Valid and Reliable Levels of Attributes

Selection of 5 attributes with 3 levels to the "rice breeders" and 4 attributes with 3 levels to the "general public" create 243 and 81 "possible combinations of responses" (i.e. 3^5 and 3^4, respectively), which, certainly, makes complications in data analysis due to computational issues. Therefore, it was required to get rid of one level from each attribute to lessen the burden on empirical analysis.

Table 1 – Attributes and levels selected for the breeders study:

	Attribute		Levels
01	Community Participation (COMPRT)	**1.1**	Include in national policies and action plans is done; But it is not essential to have community participation (GVT) *
		1.2	Community participation is done; But not essential to include in national policies and action plans (COM) *
		1.3	Include in national policies and action plans, concurrently with community participation (GTC)
02	Public Access to the Identified Area (ACCESS)	**2.1**	Current access will be decreased by 50% (RESTRICT) *
		2.2	Continue with the current access (CONTINUE) *
		2.3	Access will be completely stopped (PROHIBIT)
03	Fines on Destruction (FINES)	**3.1**	Rs. 500 for any activity lead to destruction (MODERATE) *
		3.2	Rs. 1000 for any activity lead to destruction (HEAVY) *
		3.3	No additional fine should be imposed (NONE)
04	Most Suitable Conservation Method (CONMTD)	**4.1**	In-situ conservation by enhanced information mgt. (IN-SITU) *
		4.2	Ex-situ conservation by enhanced information mgt. (EX-SITU) *
		4.3	No need to have any special conservation program (NO-NEED)
05	Reduced Cost of Pesticide as BPH Resistant Gene Inserted (CSTRED)	**5.1**	25 percent reduction of the current cost (25-RED) *
		5.2	50 percent reduction of the current cost (50-RED) *
		5.3	There is no significant difference (NO-DIFF)

Note: BPH = Brown Plant Hopper

Table 2 – Attributes and levels selected for the general public study:

	Attribute		Levels
01	Extent of Sites to be Conserved in Wavulpane area (EXTSITE)	**1.1**	Like to conserve all the identified RWR sites (ALL) *
		1.2	Like to conserve few of the identified RWR sites (FEW) *
		1.3	Do not like to conserve any of the RWR sites (NONE)
02	Most Suitable Conservation Method (CONMTD)	**2.1**	Government authorized programme with the participation of community (GVTCOM) *
		2.2	Government regulatory body (GVTREG) *
		2.3	With the participation of village community control by the government and non-government organizations (COMNGO)
03	Type of Stakeholder Participation (STAKEH)	**3.1**	Both In-situ and Ex-situ conservation (BOTH) *
		3.2	In-situ conservation (INSITU) *
		3.3	Ex-situ conservation (EXSITU)
04	Hours They Like to Commit for RWR Conservation Program (HOURS)	**4.1**	Four hours per day (4-HOURS) *
		4.2	Two hours per day (2-HOURS) *
		4.3	Do not like to contribute (0-HOURS)

To reduce the combinations to a manageable level, the most important two levels of each attribute were, therefore, taken into account as it would result only 32 and 16 combinations (i.e. $2^4 = 32$ for breeders and $2^4 = 16$). To select these most valid and reliable 2 levels of each attribute, both sets of attributes were forwarded to a small sample of senior rice breeders (n = 10) who were also the participants to the FGDs carried out earlier. The information gathered

through which were next subjected to the Fractional Factorial Experimental Design (FFED) technique, where the ½ of FFED containing of 16 and 8 treatment combinations were employed to come up with a feasible solution (Suranga and Gunarathne, 2007). This helped to remove a number of elements from the choice sets (marked * in Table 1 and 2).

Collection of Data

Phase I – Rice Breeders

In Phase I, a face-to-face interview supported by a structured questionnaire consisting of those selected attributes (and their levels) was conducted with a cross section of 30 senior rice researchers and breeders during the period of May 2009 to July 2009 to collect data. The respondents were selected purposively from both the government and private institutions work on research and development of genetic base of rice and other crop varieties in Sri Lanka, including those from the PGRC, RRDI, Fruit Research and Development Center, Plant Virus Indexing Center and senior academics attached to the Faculties of Agriculture in the national university system (e.g. University of Peradeniya and Wayamba University of Sri Lanka).

Phase II – General Public

In Phase II, Wavulpane village located in Rathnapura district was selected as the study area to collect data by means of a Participatory Community Appraisal (PCA). The selection of the study area was justified on the following reasons: (a) the community is sufficiently aware and knowledgeable about RWR; (b) the wild rice relative of *Oryza granulata* is available predominantly in this area, and (c) there is no weedy rice problem prevailing in this area.

The research team hosted the PCA in July 2009, where a Choice Experiment Survey was carried out using a purposive sample of 50 respondents. Each respondent was qualified to be a member of the experiment, if he/she was above 18 years old and be the decision maker of the household in terms of its economic activities. About 500 potential candidates from nearly 300 households in the village were screened for this purpose with the help of the Grama Niladhari and other prominent social workers in the village to select 50 residents for the

sample to which, however, more than one participant from the same family was not included. Similar to Phase I, a structured questionnaire consisting of those selected attributes and their levels and questions to gather information with regard to the socio-economic conditions of respondents were used in the PCA.

Analysis of Data

The percentage of a given "level of an attribute" selected by the respondents was estimated in order to identify the "most preferred" levels of an attribute. The Multinomial Logistic (MNL) Regression was employed to assess the relationships between the dependent variable (non-metric) and independent variables (metric or dichotomous) using the "Statitical Package for Social Sciences (SPSS) [version 16].

RESULTS AND DISCUSSION

Perceptions of Breeders on CWR Conservation

The percentages of different levels of an attribute selected by breeders in the sample (n=30) for five attributes considered in Phase I is illustrated in Figure 1.

It highlights that the majority of breeders were in favor of involvement of the government to conserve and manage CWR by formulating appropriate national policies. They stressed the necessity of establishing an appropriate institutional framework that is capable of bringing the major stakeholders work in this respect into a consortium. Nevertheless, there were strong arguments with regard to certain inefficiencies of current research system especially inability to organize the research work towards a common operational network. Those in favor of the involvement of community to conserve and manage CWR have, in contrary, pointed out the importance of establishing participatory conservation.

Nearly 60 percent of breeders claimed that the access to the identified sites of RWR should be "limited by 50%" from the current rates, while the others preferred the "current rates" of access. A large number of scientists participated to Phase II highlighted the importance of imposing a fine to minimize destruction of the sites of RWR stating that it would explicate indirectly the general public on the importance of the conservation and management of RWR available in the

country. However, others who did not agree with this condition reasoned out that it is practically difficult and would also lead to encroachment of new sites by the community to maintain their livelihood.

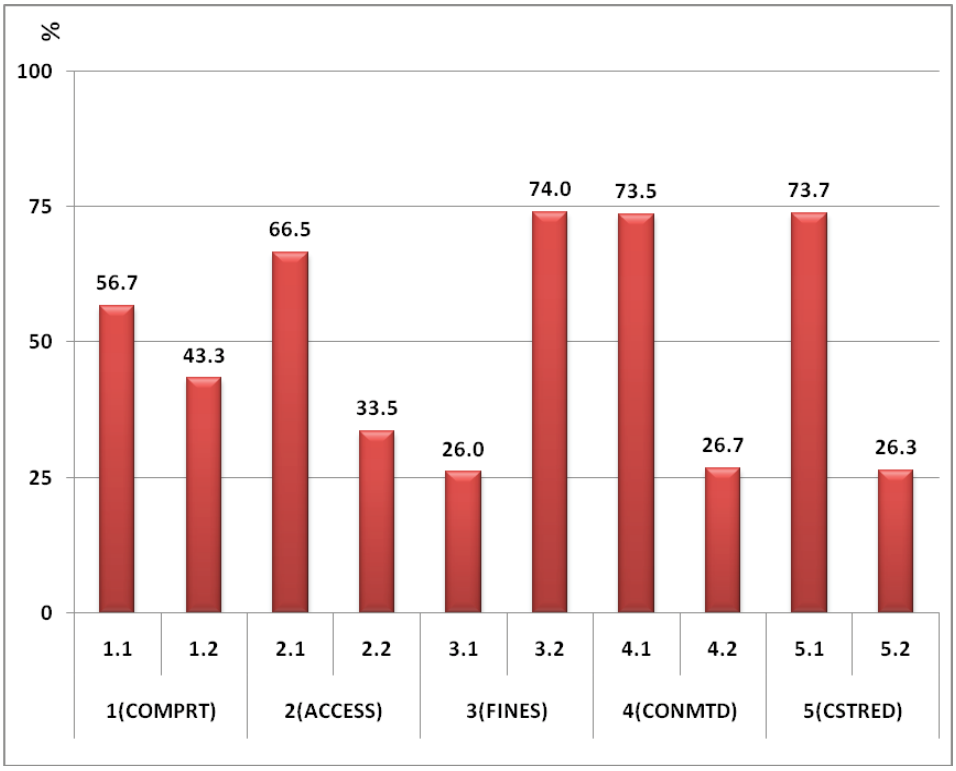

Figure 1 – Preferences of breeders on the attributes on RWR conservation

Not surprisingly, all the breeders acknowledged the importance of conserving RWR for the future. While the majority of them (73%) preferred in-situ conservation, the rest (27%) justified the importance of ex-situ conservation. The former is justified on the basis of the higher inter- and intra-species genetic diversity of RWR in Sri Lanka since even the species from the same region demonstrates high level of diversity. Further, about three fourth of breeders affirmed that there should be a "50% reduction" in cost after insertion of the BPH resistant gene into the cultivated varieties, though others insisted that it cannot be more than "25% reduction".

Almost all the breeders participated in the study were of the view that the estimated average annual yield reduction of paddy resulting from BPH attacks

was approximately 40%, and as a result, introduction of this gene in the future depend highly on the conservation of RWR. They expressed further that the cost of chemical inputs in rice cultivation could be reduced significantly if a single gene of *Oryza nivara* were to be inserted into the current gene pool along with 13 complementary genes satisfactorily, which highlighted the significance of conserving the remaining population of RWR as a whole, i.e. passive or in situ conservation, rather than as an individual seed or a plant.

Outcome of Choice Experiment for Breeders

The outcome of Choice Experiment on breeders perceptions on the aspects related to conservation and management of RWR (see, Table 1) is summarized in Table 3.

Table 3 – Coefficients of estimates of MNL regression for the breeders study

Attribute	Estimate of Coefficient	Std. Error	MWTP
Intercept	0.185**	0.170	-
01. Community Participation (COMPRT)	0.127***	0.136	2.116
02. Public Access to the Identified Area (ACCESS)	-0.106	0.161	1.767
03. Fines on Destruction (FINES)	0.061***	0.135	-
04. Conservation Method (CONMTD)	0.008	0.156	0.135
05. Reduced cost of pesticide by inserting BPH resistant gene (CSTRED)	0.360**	0.157	5.901
Log likelihood	**30.478**		**9.919**
Pseudo R^2	**0.081**		
N Observations	**240**		

MWTP = Marginal Willingness To Pay

****= Significant at 0.01 level; **= Significant at 0.05 level*

According to the results, three out of five attributes considered in the analysis (i.e. COMPRT, FINES, CSTRED) were significant at ρ=0.05 level, while other two attributes (i.e. ACCESS, CONMTD) were non-significant. In fact, according to literature on Choice Modeling, we can infer that the breeders, in general, "preferred" ("not preferred") an attribute that receives a positive (negative) sign for its coefficient. The distribution of the Marginal Implicit Prices was obtained by using equation (6), which can either be positive or negative (see, Column "MWTP" in Table 3). The overall implicit price for the desired level of attributes was estimated by taking the aggregate of all these prices, which was approximately Rs. 10 per year. This is the amount of money that the breeders are willing to pay in order to conserve the RWR. As the selected respondents have a good knowledge about RWR and its genetic resources this can be estimated precisely as the average value of benefits for an individual by conserving RWR.

Descriptive Statistics Pertaining to the General Public

Out of 50 participants selected to the Phase II, nearly 56 percent were "males" out of which 42 percent were in the age category of 30 to 45 years. About 66 percent of people in the sample were engaged in agriculture related activities (mostly cultivating rice and home gardening) to earn their livelihood. It was estimated that their average monthly income was approximately Rs. 3,600 (Table 4). Figure 2 illustrates the percentages of different levels of an attribute selected by the participants to the Phase II for the four attributes presented to them each containing two levels.

The results from Phase II suggest that about 52 percent of general public in the area were aware of presence of RWR of *Oryza granulata* and they called it as "*Uru wee*". Almost all participants, except one, have asserted that it has no direct use for their livelihood. The remaining participant claimed that he uses it occasionally for medicinal purposes. Grazing and various other human practices were observed as the major reasons behind the loss of RWR population in this area. However, the vast majority of participants affirmed that they would be willing to stop such activities that destruct the RWR populations, if they were provided with opportunities to participate in programs aimed at conserving RWR in the area that would compensate for the benefits forgone. Over 66 percent of respondents have accepted in-situ conservation of the selected RWR sites and almost 90 percent expressed the need for conservation to be carried out by a government authorized body with the participation of the village community (89%).

Table 4 – Descriptive statistics of general public:

Parameter	Frequency	Percentage
Gender		
Male	28	56
Female	22	44
Age (yrs)		
< 30	11	22
30-45	21	42
46-60	9	18
> 60	9	18
Income (Rs. / Month)		
<1000	8	16
1000-5000	33	66
5000-10000	6	12
>10000	3	6
Occupation		
Farmers	33	66
Other	17	34

Outcome of Choice Experiment for the General Public

The outcome of Choice Experiment used to assess the perceptions of general public on four specific criteria related to conservation and management of RWR in the Wawulpane area (see, Table 2) is summarized in Table 5. Positive coefficients for the in-situ conservation method (CONMTD) and for government authorized body with the participation of community (STAKEH) show that the community prefers a government authorized in-situ conservation program to which they are willing to contribute four hours per month. The negative sign for the variable on the extent of sites to conserve (EXTSITE) implies that the community prefers to conserve some selected sites as *O. granulata* populations are predominantly prominent everywhere. The positive values indicate that the villagers would be willing to trade off or forgo in order to gain schemes with more

desirable attributes or from a public policy perspective it is the amount of money that government should compensate villagers.

The distribution of the Marginal Implicit Prices shown in the Column "MWTP" in Table 5 was used to calculate the overall implicit price for the desired level of attributes. The results show that an individual in the community is willing to pay approximately Rs 83 per year for an in- situ conservation program executed by the government to conserve some selected sites with the participation of community.

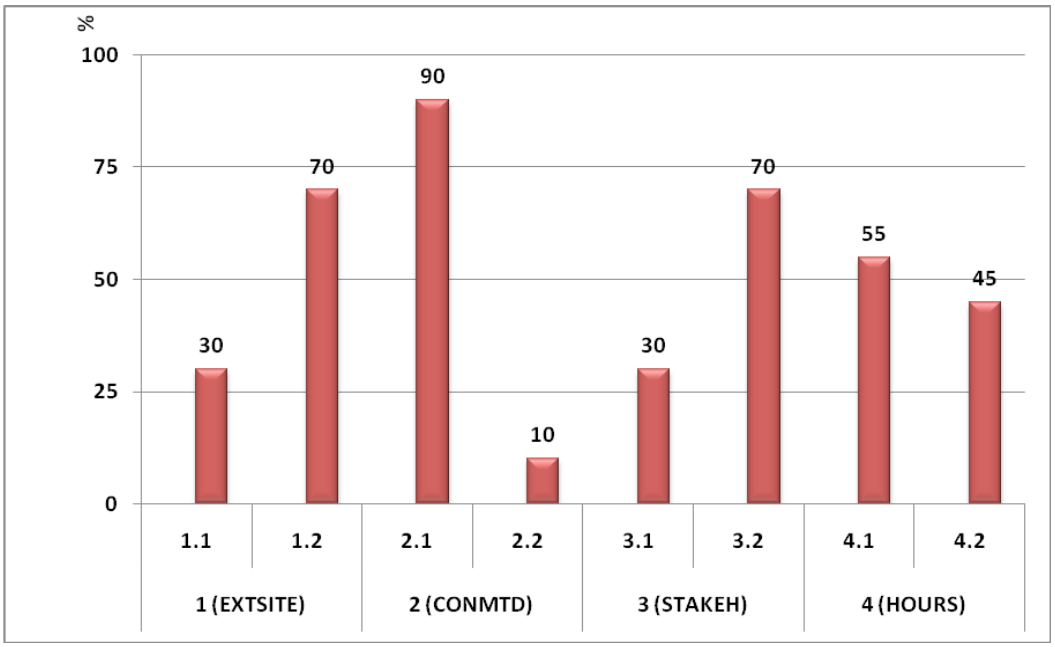

Figure 2. Preferences of general public on the attributes on RWR conservation

The value that the breeders are willing to pay is very much lower than the community which could be due to various reasons such as "mental account" they may have on their contribution towards the CWR conservation being involved with breeding in Sri Lanka for a long period of time. It could also be due to the fact that the breeding experts believe that their contribution should be mainly out of their expertise rather than in monetary terms while the community sees the contribution through their labor.

Table 5 – Coefficients of estimates of MNL regression for the general public study:

Attribute	Estimate of Coefficient	Std. Error	MWTP
Intercept	1.504***	0.364	-
01. Extent of Sites to Conserve (EXTSITE)	-2.392**	0.525	-31.47
02. Conservation Method (CONMTD)	1.940**	0.498	25.52
03. Type of Stakeholder Participation (STAKEH)	1.956**	0.745	25.74
04. Hours Like to Commit (HOURS)	0.076**	0.638	-
Log likelihood	**79.901**		**82.73**
Pseudo R^2	**0.263**		
N Observations	**240**		

*MWTP = Marginal Willingness To Pay ***= Significant at 0.01 level; **= Significant at 0.05 level*

CONCLUSIONS AND POLICY IMPLICATIONS

This study was aimed to understand the extent to which the stakeholders responsible for conservation and management of rice wild relatives are willing-to-contribute towards RWR and to explore the operationalisation mechanism of a conservation program for the same with the participation of all stakeholders. It, in turn, examined the choices and tradeoffs of the researchers / breeders and the community on different RWR conservation options and provides an option value for the RWR to be used in total economic valuation.

During the Phase I, we have identified that the preferred policy choice set for RWR conservation was government involvement in conservation programs, limiting the public access in to these areas by 50 percent, imposing fines at high premiums, implementation of strategies that encourage in-situ conservation through enhanced information management systems. In addition, breeders expect at least 50 percent reduction of cost of control of BPH attacks if the resistance gene to be incorporated into the cultivated rice. In fact, the cost reduction by

introduction of the BPH gene was recognized as the most significant attribute in selecting particular choice option and economic valuation.

We found that people in the adjacent community has clearly recognized the direct benefits that they would receive from any in-situ conservation program to contribute for such a program. Prevailing uncertainties in income from agriculture might have led them to think of alternative income sources through such programs. The lower values expressed by the breeders were of the view that this as an activity of national interest and would like to contribute mainly through their service to accomplish this task satisfactorily. The economic valuation study implies that conservation of five RWR available in Sri Lanka, of which the gene sequence varies significantly with regard to different populations belonging to different areas of the country, can be done *in-situ* effectively if the alternative institutional arrangements for this task are set up and the policies/programs of which are, in turn, designed and executed with appropriate time-dimensions (i.e. short and long term) to satisfy various organizational goals (i.e. CSR activities, income earning).

In this process it is important to get the support of three types of stakeholders to make it happen effectively, i.e. those plant breeders who possess years of experience in rice breeding; national, regional as well as local level policymakers from various institutions who set and implement policies, and finally the general public who live adjacent to the naturally growing populations of RWR in different parts of the country. Though there are minor differences in perceptions among the different groups, it may not affect achieving a common goal of conservation of CWR. Therefore, we believe and highlight the importance of coordinating the activities of these three types of social systems linked with protection of agro-biodiversity, in general, and crop wild relatives, in particular, in Sri Lanka by a focal point of administration that possesses and ability and resources to direct and make appropriate policy decisions to enhance the process of incorporating ecosystem into the market economics.

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