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Modeling the determinants of the social impacts of agricultural development projects

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ABSTRACT

In an attempt to help policy-makers improve the social sustainability of development projects, this study identifies the key determinants of farmers' attitudes relating to the social impacts of the floodwater spreading project (FWSP) on the *Gareh-Bygone* plain in Iran. In order to analyze the links between the various factors that affect the experience of social impact, a theoretical framework was developed. Stratified random sampling was used to survey 138 farm households from the four villages in the region. One male and one female from each house were interviewed face-to-face using a questionnaire, resulting in a total of 276 interviews. Structural factors were found to be the largest contribution to stakeholders' attitudes relating to the social impacts of the project. Results from a cluster analysis suggested that the level of floodwater information, level of participation, water access, ownership change, and environmental worldview were the most important factors explaining attitude towards social impact of the FWSP.

1. Introduction

In line with a triple bottom line approach to sustainable development, the social dimension is of particular importance in considering the sustainability of rural development projects (Ahmadvand and Karami, 2009; Ahmadvand et al., 2009; Vanclay, 2004). Establishing a floodwater spreading project (FWSP) as an agri-environmental project requires understanding its social impacts as well as its economic and ecological dimensions. Social impact assessment (SIA) is a tool for assessing and managing the social consequences of development projects (Vanclay, 2003). The objective of SIA is to identify the intended and unintended social impacts of planned interventions in order to develop sustainable management plans (Barrow, 2000). However, there has been little research into the social determinants that may affect the social outcomes of agricultural development projects (see Ahmadvand and Karami, 2009 for one example). Focusing on the key determinants of stakeholder attitude formation toward the social impacts of agricultural development projects is important, because it helps project planners, project proponents, and decision-makers in better understanding stakeholders' characteristics and values. This knowledge helps in making projects more inclusive and in ensuring that projects are designed to 'fit' the affected people (Pisani and Sandham, 2006).

The experience of social impacts of agri-environmental projects like FWSP, or of any project for that matter, is likely to be influenced by dispositional, demographic and situational factors such as environmental worldviews and attitudes (McFarlane et al., 2006). Environmental worldviews are beliefs that are not specific to any particular issue and that form the basis of attitudes, judgments, and behaviors which may be directed towards more specific environmental issues (McFarlane et al., 2006). Individuals with a strong ecological worldview tend to have pro-environmental attitudes on a wide range of issues and may downplay social concerns, especially if they are at odds with ecological outcomes.

Education is also an important determinant of attitude formation toward agri-environmental projects. Almost all research into attitudes regarding agri-environmental activities has found that highly educated respondents have more pro-environmental values than less educated respondents and consequently they tend to evaluate agri-environmental projects more positively (Kalantari et al., 2007; Karami and Mansoorabadi, 2008; Shobeiri et al., 2006; McMillan et al., 1996).

Socio-cultural factors such as holding religious and spiritual values, information about the projects and the degree of participation in a project can also influence the attitudes of stakeholders. Studies suggest that spiritual individuals, people with higher levels of information about the projects, and stakeholders with high participation in pro-environmental projects tend to exhibit more positive attitudes toward natural resource conservation issues and tend to be more supportive of resource protection-oriented management (Kaczensky et al., 2004; Karami and Mansoorabadi, 2008; Vaske and Donnelly, 1999). Furthermore, the relationship between attitude toward pro-environmental projects and quality of life is also debatable. Slimak

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and Dietz (2006) noted that environmentalism was most likely a middle or upper middle class phenomenon. However, they noted that the effect of being upper class on environmental worldview was confounded by education. Highly educated middle class respondents were more concerned about the environment than were their less educated counterparts.

In summary, the reviewed literature indicates that worldview, quality of life, education, information, and participation are the most commonly-used independent factors affecting the attitudes of stakeholders regarding the impacts of agri-environmental projects. Therefore, the aims of this research into the social impacts of the FWSP on the Gareh-Bygone plain, Fars Province, Iran were twofold. First, to identify the attitudes of people in farm households regarding the social impacts of the FWSP. Second, to determine the key determinants of attitude formation toward those social impacts.

2. Theoretical framework

Perusal of the SIA literature reveals that several social scientists have made attempts to develop comprehensive frameworks for analyzing the impacts of development projects (e.g. Vanclay 2002). Slootweg et al. (2001) provided one such conceptual framework which forms the basis of the theoretical framework used in this study. It identifies the pathways by which environmental and social impacts derive from specific projects and in that way assists in thinking about all the social impacts that may arise. Slootweg et al.'s framework was designed to have broad application and it provided insight into, and understanding of, the complex cause–effect relationships, or impact pathways. The framework separates a physical change to the environment from a physical impact. In particular, it shows that the social impacts can be influenced by interventions through indirect as well as direct pathways. Direct social impacts originate directly from the intervention via the social change processes. Social change process that result from the intervention, the so-called first-order changes, can lead to the second- and higher-order changes. Indirect social impacts result from changes in the natural resource base and derived functions, that is, from the biophysical changes. Furthermore, social change process can also provoke biophysical changes (see Fig. 1). It should be noted that many social changes are not in themselves 'social impacts'. If 'social impacts' refer to the impacts actually experienced by humans, then many impact variables commonly measured in SIA studies are not impact, but change process that may lead to impacts (Vanclay, 2002). Further, all social and biophysical changes do not necessarily lead to social impacts, but there are social 'filters' which may accelerate, hinder, modify, or moderate change process. Therefore, the ways in which the social and biophysical changes are perceived, given meaning, or valued as a social impact depend on the filters that are in place (see Fig. 1). Some of these filters are listed below.

2.1. Demographic filter

A variety of demographic factors including level of education, level of information, and participation in FWSP could modify or moderate the social impacts of FWSP on the Gareh-Bygone. Level of education is a strong determinant of attitude about social impact of project. Knowledge and information lead to confidence, skill, ability and experience. Level of stakeholder participation in the process of project management may influence their attitudes toward the project. Stakeholders with more involvement in the project are expected to have more positive attitudes regarding social impact of the FWSP.

2.2. Structural filter

This model assumes that a structural filter such as irrigated agricultural land, land ownership changes, type of village, and access to water resources influences respondents' attitudes toward the social impacts of the project. It is expected that farm households with different changes in their land ownership (gained or lost land or rangeland) have different attitudes toward social impacts of FWSP. Positive changes in ownership lead to positive attitudes regarding social impact of the FWSP. The farm households in upstream and downstream villages also may have different attitudes toward the social impact of the FWSP. This is due to the fact that FWSP has increased the water access to downstream villages while has reduced land access in upstream villages (Hope, 2007; Kerr et al., 2002). Finally, the framework assumes that access to water resources and irrigated agricultural lands are fundamental contributors towards attitude formation about social impact of the project.

2.3. Personal filter

The framework assumes that religious and spiritual values contribute towards households' experience of social impacts of FWSP. It assumes that spirituality is a resource in maintaining the environment and contributes to positive evaluation of pro-environmental projects. Perceived attitude of reference groups toward FWSP is expected to influence rural people's attitudes regarding the project. One feature of this framework is that access to information regarding FWSP is a fundamental contributor of respondents' attitudes toward social impacts of the project. In addition, a correlation between respondents' environmental worldviews and attitudes toward the project is assumed. Stakeholders with a strong ecological worldview are expected to have pro-environmental attitudes on a wide range of issues and assess social impacts of pro-environmental project positively. Furthermore, as illustrated in Fig. 1, social impact is categorized to two sub-impacts including socio-economic and socio-cultural impacts. Socio-economic sub-impact included quality of life, rural and agricultural economic conditions, and conservation of community resources. Socio-cultural sub-impact involved perceived well-being, social capital, and social structure development.

3. Methodology

Data for the study were acquired by the use of a questionnaire to be implemented in face-to-face interviews. A draft questionnaire was pilot-tested using a sample of 26 households in a village outside the study area. The questionnaire was improved based on the pilot study results. A panel of experts confirmed the face validity of the questionnaire items.

Because the FWSP on the Gareh-Bygone plain commenced in 1983, to ensure the respondents had experienced living conditions before the FWSP, the population of the study was defined to include only those farm households who had some members (at least one male and one female) over 35 years of age. This provided the opportunity to compare the situation of social criteria before the FWSP (T_1) with the present (T_2).

A stratified random sampling approach was used to draw a sample of 138 farm households from the four villages affected by the project, *Ahmad-Abad, Bisheh-Zard, Rahim-Abad,* and *Tchah-Dowlat*. Interviews were conducted, simultaneously but separately, with one male and one female over 35 years old from each randomly selected farm household. Therefore, a total of 276 interviews were conducted. Respondents in each household were typically husband and wife. However, in cases where one spouse was not available, the most senior member of the household who fitted the criteria was interviewed. The senior author interviewed males. Considering the conservative cultural environment of Moslem rural areas, a trained female college graduate interviewed females.

The definition and measurement of the variables used in the study are presented in Table 1. All statistical analysis were performed using the SPSS statistical package (version 15.5) and included reliability measures, analysis of covariance (ANCOVA), hierarchical regression,

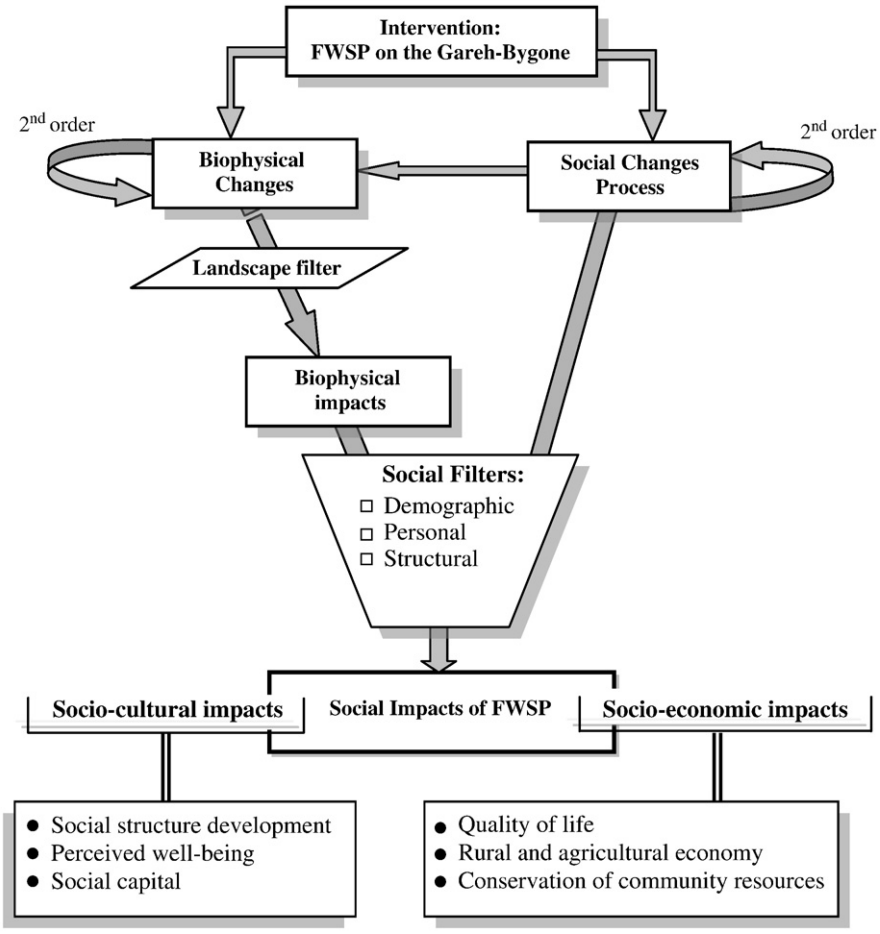

Fig. 1. Theoretical framework to explain the determinates of the social impacts of a floodwater spreading project (adapted from Slootweg et al. 2001).

and cluster analysis. A significance level of 0.05 was used to establish statistical significance.

It is likely that the relative importance of each social impact variable and related items will differ according to specific conditions. Therefore Analytic Hierarchy Process (AHP) was used to weigh the social impact criteria and their items (Byun, 2001). A selected group of farmers from the Gareh-Bygone plain scored each item in a criterion pair-wise comparison with all other items, with respect to an item at a higher level. Therefore, the respondents' judgments of the importance of one item over another in each social impact criterion was considered subjectively and converted to a numerical value using a scale of 1-9 (Table 2) in a matrix. Finally, an algorithm based on the eigenvalue of this matrix was used to calculate the relative weight of the social impact items (Traintaphyllou, 2000). The total weight of each social criterion was calculated by:

$$FS_{ca} = \sum W_{cai} \cdot S_{ica}$$

where, FS_{ca} = Final score of social impact criterion a, W_{ica} = weight of the *i*th social impact item in criterion a, S_{ica} = amount of *i*th social impact item in criterion a.

This stage was repeated for each social impact criteria. Since every social system has two social sub-dimensions (socio-economic and socio-cultural) (Barrow, 2000), the social impacts of the interventions were also classified into socio-economic and socio-cultural sub-impacts. So, in this study, normalized weights or coefficients for each social sub-dimension were calculated. Socio-economic (SE) sub-impacts include quality of life (QoL), rural and agricultural economic conditions (RAE), and conservation of community resources (CCR). Socio-cultural (SC) sub-impacts involve perceived well-being (PWB), social capital (SCA), and social structure development (SSD) (Ahmadvand and Karami, 2009). Therefore, the two social sub-impacts of FWSP on the Gareh-Bygone plain were constructed by using the following formulas (see Ahmadvand and Karami, 2009):

$$SE\ impacts = 0.32\ QoL + 0.37\ RAE + 0.31\ CCR$$
$$SE\ impacts = 0.44\ PWB + 0.32\ SCA + 0.24\ SSD.$$

3.1. The study site: Gareh-Bygone FWSP

The Gareh-Bygone plain (28°35′N, 53°53′E), part of the Sheebkuh region, is located 50 kilometers southeast of Fasa in Fars province, Iran. The region has a history of drought, groundwater degradation, and water scarcity. The mean annual rainfall and evaporation over the last 10 years of the plain are 243 and 3200 mm per annum respectively (Kowsar, 1992).

In 1979, the former Jihad-e-Sazandegi, an organization established after the Islamic revolution of 1978 for reconstruction of rural areas, dug the first well in the region to assist local herders to produce fodder. Then, because of the shortage of water in the plain, in 1983 a 'floodwater spreading and aquifer project' was designated the Range and Forest Research Institute of Iran, to utilize the flows of the *Bisheh-Zard* and *Tchah-Qootch* ephemeral streams (Kowsar, 1992).

The four villages included in this study, *Ahmad-Abad*, *Rahim-Abad*, *Bisheh-Zard* and *Tchah-Dowlat*, which in 2008 collectively had about 395 households and a total population of 2173, have benefited the most from the project. The residents of these villages are mainly nomads from *Arab-E-Khamseh* tribe who undertook traditional animal

Table 1
Operational definition of the variables used in the model.

Variable name	Definition and measurement	Min	Max
Social impacts of FWSP	Refer to the methodology section of the main text	1	5
Perceived well-being (PWB) $=(\sum_{i=1}^{9} W_iY_i)/9$	Well-being was measured using 9 items (happiness, life satisfaction, security, communication, etc.). $\mathbf{W_i}$ = relative weight of each item in well-being dimension. $\mathbf{Y_i}$ = the status of each item of the social dimension was measured an ordinal 5-point scale ranging from (1) very low to (5) very high, before and after the project.	1	5
Social capital (SCA) $=(\sum_{i-1}^{10} W_iY_i)/10$	Social capital dimension was measured using 10 items (trust, membership, participation, etc.). W_i = relative weight of each item in social capital dimension. Y_i = the status of each item of the social dimension was measured an ordinal 5-point scale ranging from (1) very low to (5) very high, before and after the project.	1	5
Quality of life (QoL) $=(\sum_{i-1}^{15} W_iY_i)/15$	Rural Quality of Life Index (RQLI) was developed by Dhanasekaran (1991) and revised by Karami and Hayati (2005). The scale measures quality of life using 15 criteria (income, education, assets, participation. etc.) W_i = relative weight of each item in quality of life dimension. Y_i = the status of each item of the social dimension was measured an ordinal 5-point scale ranging from (1) very low to (5) very high, before and after the project.	1	5
Social structure development (SSD) $=(\sum_{i=1}^{7} W_iY_i)/7$	Social structure was measured using 7 items (Social distance, family conflict, farmer conflict, etc.). W_i = relative weight of each item in social structure dimension. Y_i = the status of each item of the social dimension was measured an ordinal 5-point scale ranging from (1) very low to (5) very high, before and after the project.	1	5
Rural and agricultural economic conditions (REC) $=(\sum_{i=1}^{7} W_iY_i)/7$	Rural economic conditions were measured using 7 items (production, income, female contribution, etc.). W_i = relative weight of each item in rural economic dimension. Y_i = the status of each item of the social dimension was measured an ordinal scale ranging from "very low" (1) to "very high" (5) in before and after the project.	1	5
Conservation of community resources (CCR) $=(\sum_{i=1}^{13} W_iY_i)/13$	Community resources was measured using 13 items (forest, farm lands, range lands, water quality and quantity, etc.). W_i = relative weight of each item. Y_i = the status of each item of the social dimension was measured an ordinal 5-point scale ranging from (1) very low to (5) very high, before and after the project.	1	5
WORLDV (Environmental worldview)	Environmental worldview was assessed using the New Ecological Paradigm (NEP) scale developed by Dunlap et al. (2000).	15	45
AREA (Irrigated area)	The hectares of irrigated lands managed by household	–	–
EDUC (Education)	Years of respondent's education	–	–
REFRE (Attitude of reference group)	This variable measures the perceived attitude of significant others toward the FWSP and degree of respondent commitment toward those attitudes.	0	1
RELIG (Religious and spiritual values)	A scale measuring agreement with a series of religious and spiritual beliefs: summation of response to 16 items. They were measured an ordinal 3-point scale ranging from (3) agree, (2) neutral, and (1) disagree.	16	48
PARTI (Participation)	Level of participation in the floodwater spreading project measured by seven yes/no questions.	7	14
OWNER (Ownership changes)	It was measured with regard to farmers' ownership changes (gained or lost) by the project in farm lands, range lands, number of domestic animal, etc.	–	–
INFORM (FWSP information)	The variable measures a farmer's access to seven sources of information (extension programs, extension publication, radio and TV programs, etc.) about the project.	7	14
RESOUR (Access to water resources)	Access to water was measured in terms of access to a range of agricultural water sources including qanats, springs, wells, rivers, etc. (more is better)	5	10
VILLAGE (Type of villages)	The type of village was measured as a dummy variable with upstream (0) and downstream (1).	0	1

W_is are relative weight of each item in a social dimension which farmers have reported using AHP.

husbandry before initiation of the project, has subsequently changed to irrigated agriculture. After 25 years, the plain has changed into eucalyptus forest. Another important change due to the project was considerable expansion of irrigated agriculture. The area of rain-fed farming decreased by 22%, while the irrigated areas increased 1.32 fold (Kowsar and Pakparvar, 2003). The expansion of irrigated lands has led to major increases in the income of farmers (Kowsar and Pakparvar, 2003). Correspondingly, the number of the livestock decreased by 41%, while the harvested area increased 2.04 fold. Although the project is one of the successful projects at national and international levels in terms of environmental impacts, a growing sense of dissatisfaction with the project has emerged among local people. Farmers and community people feel they were deprived of the right to contribute to decisions about the plain. Therefore, the conflict between local people and agricultural experts has intensified (Ahmadvand and Karami, 2007).

Table 2
The analytic hierarchy process comparison scale.

Intensity of importance	Definition
1	Equal importance
3	Moderate importance of one over another
5	Strong or essential importance of one over another
7	Very strong importance
9	Absolute importance
2, 4, 6, 8	Intermediate values between adjacent judgments
Reciprocal of above	If factor *i* has one of the above numbers assigned to it when compared to factor *j*, then *j* has the reciprocal value when compared with *i*

Source: Byun, 2001.

4. Results and discussion

4.1. Profile of the respondents

In order to give a profile of the households who were interviewed, a brief description of farm household characteristics is presented. Although men's formal years of education ($\bar{x}=3.67$) was higher than for women ($\bar{x}=2.33$), only 1.4% of men and 0.3% of women had higher education. While agriculture was the main occupation (47%) of rural households in the study, 25% raised small livestock (sheep and goats) and 25% were mixed farmers (small ruminants and some crop production). The paired *t*-test analysis concluded that there was no significant difference between men ($\bar{x}=2.71$, SD = 0.48) and women ($\bar{x}=2.70$, SD = 0.48) with regard to present well-being ($t=0.19$, $p=0.84$). Social capital also was compared. The finding showed that there was a statistically significant ($t=$-2.05, $p=0.04$) but minor difference between men and women with regard to present social capital (men $\bar{x}=2.79$ and women $\bar{x}=2.88$). The level of religious and spiritual belief between males and females was also investigated. The

result showed that there was no significant gender difference (men $\bar{x}=34.48$, women $\bar{x}=34.47$; $t=0.05$, $p=0.95$). The attitudes of males and females were compared in order to illuminate differences, if any, between their environmental worldviews. The test showed that there is significant difference between men ($\bar{x}=30.81$, SD = 1.88) and women ($\bar{x}=32.73$, SD = 3.00) in terms of environmental worldview ($t=6.63$, $p=0.0001$). That is, women possess more positive attitudes toward sustainable agriculture and environmental protection (Karami and Mansoorabadi, 2008). Researchers have found evidence that women are more pro-environment or possess stronger environmental attitude than men (Brody et al., 2004), as was also found by this study.

4.2. Social impacts of the project: A gender analysis

The social impacts of FWSP on the Gareh-Bygone were investigated with regards to socio-economic and socio-cultural sub-impacts (see Ahmadvand and Karami, 2009 for more details). Socio-economic sub-impact included quality of life, rural and agricultural economic conditions, and conservation of community resources. Socio-cultural sub-impact involved perceived well-being, social capital, and social structure development. The SIA is a gender sensitive approach, that is, it acknowledges that women might have different attitudes and experiences regarding the impacts than men. Therefore, in every household of the sample for this study, the attitudes of both males and females were studied. Respondents were asked to appraise the situation at T_1 (before FWSP) and at T_2 (present time) with regards to the two social sub-impacts (see Ahmadvand and Karami, 2009 for more details).

The result from analysis of covariance (ANCOVA) of the present (T_2) socio-economic sub-dimension showed group homogeneity between men and women when controlling for the socio-economic sub-dimension before (T_2) the FWSP. The difference in adjusted means of socio-economic sub-dimension of women ($\bar{x}=3.19$) versus men ($\bar{x}=3.00$) was not significant ($F=5.144$; $p=0.086$). The findings from comparing the mean of the socio-economic sub-dimension for men ($\bar{x}=2.60$ SD = 0.32) against women ($\bar{x}=2.63$ SD = 0.20) before the FWSP also did not show any difference ($t=-0.913$; $p=0.363$). These findings revealed that the socio-economic sub-dimension as perceived by both men and women was improved after the implementation of the FWSP. In other words, the farm households in villages with the FWSP observed that the present (T_2) socio-economic sub-dimension in their villages was better than before the FWSP (T_1). It can be concluded that the project had positive influence on socio-economic sub-dimension.

The story in relation to the socio-cultural dimension, however, was quite different. The findings showed that for both women and men there was a reduction in socio-cultural well-being. The ANCOVA showed that there was no difference between males and females regarding the socio-cultural sub-dimension at present time (T_2). The difference in adjusted means of socio-cultural sub-dimension of women ($\bar{x}=2.84$) and men ($\bar{x}=2.72$) was not statistically significant ($F=3.29$; $p=0.070$). However, comparison of socio-cultural sub-dimension of men ($\bar{x}=3.51$ SD = 0.25) and women ($\bar{x}=3.23$ SD = 0.20) before FWSP showed a significant difference ($t=11.63$; $p=0.0001$). These findings revealed that the socio-cultural sub-dimension declined during the FWSP as perceived by both men and women. This finding was unexpected as it would normally have been expected that both socio-economic and socio-cultural dimensions of the farm households would improve with the FWSP. For this FWSP and all other agricultural development projects in developing countries, the primary aim is technical improvements, and unfortunately the social dimensions are often ignored. Although, the FWSP on the Gareh-Bygone plain was successful in technical terms, the project was a failure due to lack of social support.

4.3. Determinants of households' attitude toward social impacts of FWSP

Because for this project there were few gender effects, at least for the variables considered, in this section we provide an analysis of the determinants of social impacts toward the Gareh-Bygone FWSP at the farm household level. Variables representing the household level of education, level of participation, level of information about the project, environmental worldview, and spiritual and religious values were developed by combing the scores of husbands and wives of each household.

Based on the theoretical framework of the study (Fig. 1), it was hypothesized that a variety of social filters, including demographic, structural, and personal, contribute to the formation of attitudes toward the social impacts of the FWSP. The dependent variable of the analysis was the household's perceived social impacts of the project.

4.3.1. Determinants of household appraisal of SE impacts

The results of the hierarchical regression analysis are presented according to stage of its factors' entrance into the model. The theoretical model hypothesized that demographic, personal, and structural filters influence the attitude of households toward socio-economic sub-impact of FWSP. The demographic factors were added to the model at the first stage (Table 3). Where, PARTI is level of household's participation in FWSP process, EDUC is level of education, INFORM is level of information toward FWSP.

The low R^2 at this stage of analysis reveals (Table 3) that the entrance of demographic filter into the model provides little predictive power. In other words, only about 9% of the variance in the household's SE sub-impact was explained by the demographic filter and its factors.

Personal filter and its factors were expected to have significant influence on attitude of household toward SE sub-impact of the FWSP. The personal filter included religious and spiritual values, environmental worldview, and attitude of household's reference group. This group of factors was added to the model at this stage (Table 3). Where, RELIG is the level of religious and spiritual values of household, and WORLDV is the score of environmental worldview of household, and REFRE is the attitude of household's reference group regarding FWSP.

Summary findings in Table 3 show that in the presence of other variables in the equation, addition of personal filter and its factors to the model improved the predictive power only by 6%. The literature shows a limited number of studies confirming a direct relation between the environmental worldview and attitude toward pro-environmental projects. The finding of this study is consistent with the finding of Corral-Verdugo and Armendlariz (2000) regarding the role of personal factors on forming attitudes of stakeholders. They found a correlation of 0.21 between the environmental worldview and a measure of reuse attitude and behavior in a Mexican community. At the third stage, the structural filter including irrigated land, ownership changes, type of villages, and access to water resources was added to the model (Table 3). Where VILLAGE is the location of household in upstream or downstream villages of the project, OWNER is the amount of changes in land ownership of household due to the project, AREA is the hectares of

Table 3
Summary results of hierarchical regression of socio-economic sub-impact of Households.

Model	R square	Adjusted R^2	Change in R^2	Sig. change
1[a]	0.091	0.068	0.091	0.010
2[b]	0.152	0.107	0.060	0.049
3[c]	0.490	0.444	0.339	0.001

Dependent variable: SE sub-impact of household.
[a] Predictors:(Constant), PARTI, EDUC, INFORM.
[b] Predictors: See Model 1, RELIG, REFRE, WORLDV.
[c] Predictors: See Model 2, AREA, OWNER, VILLAGE, RESOUR.

irrigated lands which are managed by household, and RESOUR is household's access to water resources.

Structural filter and its factors improved the predictive power of the model considerably. Structural filter explain about 34% of the variance in the SE sub-impact for household (Table 3). It was expected that the structural variables have significant impact on attitude formation toward socio-economic dimension of households. Entrance of all structural factors into the equation provided the final model presented in detail in Table 4. The hypothesis that all regression coefficients of this model are equal to zero was rejected ($F=10.578$, $p<0.001$). The standardized coefficients (Table 4) revealed that one standard deviation change in amount of level of household's education (EDUC), level of household's participation in FWSP (PARTI), household's ownership changes (OWNER), and household's village (VILLAGE), results in 0.147, 0.217, 0.183, and 0.505 standard deviation changes in SE sub-impact of households respectively. The *t*-values of these variables are significantly different from zero at the 0.05 level.

Consistent with findings of this study, others have found that education is a key variable on environmental attitudes. Almost all research on environmental attitudes found that highly educated respondents have more pro-environmentalist values than lower educated respondents. The effect of education on environmental attitudes is not only direct; its effect is also indirect. Literature suggests that level of education of stakeholders is the most explanatory factor related to attitude toward environmental activities (Kalantari et al., 2007; Karami and Mansoorabadi, 2008; Shobeiri et al., 2006; McMillan et al., 1996).

4.3.2. Determinants of household appraisal of SC impacts

The hierarchical regression analysis was conducted with regard to household socio-cultural sub-impact of FWSP. At the first stage, the demographic filter was entered to the model (Table 5).Where, PARTI is the level of household's participation in FWSP process, EDUC is the level of education, and INFORM is the level of information toward FWSP.

The R^2 at this stage of analysis reveals (Table 5) that the entrance of demographic filter and its factors into the model provided little predictive power. In other words, only 9% of the variance in the household's SE sub-impact was explained by the demographic variables.

Although the literature suggests that the level of education of stakeholders is the most explanatory factor of their attitude and behavior (Kalantari et al., 2007; Shobeiri et al., 2006), the research findings revealed unexpected results about the influence of demographic factors such as education on formation of households' attitudes toward socio-cultural sub-impact of FWSP on the Gareh-Bygone. At the second stage, the personal filter including religious and spiritual values, environmental worldview, and attitude of household's reference group were added to the model (Table 5). Where, RELIG is the level of religious and spiritual values of household, and WORLDV is the score of environmental worldview of household, and REFRE is the attitude of household's reference group regarding FWSP.

Table 5
Summary results of hierarchical regression of socio-cultural sub-impacts of households.

Model	R square	Adjusted R^2	Change in R^2	Sig. change
1[a]	0.086	0.063	0.086	0.014
2[b]	0.204	0.162	0.117	0.001
3[c]	0.235	0.165	0.031	0.356

Dependent variable: SC sub-impact of household.
[a] Predictors:(Constant), EDUC, INFORM, PARTI.
[b] Predictors: See Model 1, RELIG, REFRE, WORLDV.
[c] Predictors: See Model 2, AREA, OWNER, VILLAGE, RESOUR.

The R^2 at this stage reveals (Table 5) that introducing personal factors into the model provides little predictive power. In other words, addition of personal factors to the model improved the predictive power only by 11% (Table 5).

The model also assumes that the structural factors are predictors of SC impacts assessment of households. The structural factors include irrigated land, land ownership changes, type of villages, and access to water resources. The Structural factors were added to the model at this stage (Table 5). Where VILLAGE is the location of household in upstream or downstream villages of the project, OWNER is the amount of changes in land ownership of household due to the project, AREA is the hectares of irrigated lands which were managed by household, and RESOUR is the household access to water resources.

Summary findings in Table 5 indicate that in the presence of other variables in the equation, addition of the structural factor to the model led to an improvement of predictive power by only about 3.5%. The model was able to account for 23.5% of the variance in SE sub-impact for households ($R^2=0.235$). These findings clearly show that the personal factors are the most significant variables among factors influencing of attitude of households regarding socio-cultural sub-impact of FWSP on the Gareh-Bygone plain. The personal filter is cultural based, therefore, it is assumed to influence socio-cultural dimension. The research findings revealed expected results about personal filter.

Entrance of all structural variables into the final equation of the model is presented in detail in Table 6. The hypothesis that all regression coefficients of this model are equal to zero was rejected ($F=3.372$, $p<0.001$). The standardized coefficients (Table 6) show that one standard deviation change in the amount of household's religious and spiritual values (RELIG), and attitude of household's reference group (REFRE) toward FWSP on the Gareh-Bygone results in −0.269, and 0.266 standard deviation changes in SC sub-impact of households respectively. The *t*-values of these variables are significantly

Table 4
Regression coefficient for final model of determinants of socio-economic sub-impact.

	Unstandardized coefficients	Standard error	Standardized coefficients	*t*-value	P (*t*-value)
(Constant)	2.667	0.551		4.837	0.0001
EDUC	0.012	0.006	0.147	2.031	0.045
INFORM	−0.004	0.016	−0.027	−0.273	0.785
PARTI	0.037	0.017	0.217	2.225	0.028
WORLDV	−0.004	0.011	−0.025	−0.323	0.747
RELIG	−0.003	0.015	−0.015	−0.184	0.854
REFRE	0.085	0.054	0.120	1.569	0.120
AREA	−0.003	0.002	−0.091	−1.172	0.244
OWNER	0.028	0.012	0.183	2.442	0.016
VILLAGE	0.285	0.044	0.505	6.555	0.0001
RESOUR	0.013	0.016	0.073	0.803	0.424
$R^2=0.490$					
$F=10.578(p<0.001)$					
Dependent variable: SE sub-impact of household, model 3					

Table 6
Regression coefficient for final model of determinants of socio-cultural sub-impact.

	Unstandardized coefficients	Standard error	Standardized coefficients	*t*-value	P (*t*-value)
(Constant)	3.900	0.590		6.604	0.0001
EDUC	0.010	0.006	0.133	1.497	0.137
INFORM	0.033	0.017	0.232	1.893	0.061
PARTI	−0.006	0.018	0.0001	0.0001	1.000
WORLDV	−0.002	0.012	−0.017	−0.174	0.862
RELIG	−0.043	0.016	−0.269	−2.755	0.007
REFRE	0.165	0.058	0.266	2.851	0.005
AREA	−0.003	0.003	−0.098	−1.027	0.307
OWNER	−0.004	0.012	−0.027	−0.295	0.769
VILLAGE	0.066	0.047	0.134	1.417	0.159
RESOUR	0.007	0.017	0.044	0.395	0.694
$R^2=0.235$					
$F=3.372(p<0.001)$					
Dependent variable: SC sub-impact of household, model 3					

different from zero at the 0.05 level. The negative sign of household's religious and spiritual values indicate that any increase in this variable would result in a decrease in SC sub-impact assessment of households.

Different claims have been made about whether the nature of the relationship between 'religious and spiritual values' and 'attitude toward pro-environmental project' is positive or negative. The empirical evidence is mixed (Karami and Mansoorabadi, 2008; Anders and Andreas, 2005). The findings of this study are not congruent with the findings of Karami and Mansoorabadi (2008), Anders and Andreas (2005), or Nooney et al. (2003) that religious and spiritual values may have positive effects on environmental worldview and attitude. The findings also showed that 'reference group' has contribution to explain variety of household's attitude toward SC sub-impact of FWSP on the Gareh-Bygone plain. This finding is not consistent with the findings of Karami and Mansoorabadi (2008) that those attitudes of the reference group have negative impact on attitude of households regarding environmental activity.

4.4. Typology of households with regard to SIA of FWSP

The results of hierarchical regressions which were presented in the previous section indicate that the models have little predictive power in relation to household's attitude towards social sub-impacts of FWSP on the Gareh-Bygone plain. This resulted in speculation that farm households are not a homogenous group. Therefore, in order to provide better understanding and explanation of household's attitude, a classification of farm households was conducted. Cluster analysis was used to classify the sample farm households into homogenous groups based on factors considered important in SIA (SPSS-X, 1988). Cluster analysis tries to find a natural grouping of units under consideration. Selecting the factors to include in a cluster analysis is always crucial. The concept of distance and similarity are basic to cluster analysis techniques. Distance measures are small and similarity measures are large for cases that are similar (Karami, 2006). The factors used for clustering farm households in this study, water access, participation, floodwater information, ownership change, and environmental worldview. A problem arises when factors are measured on different scales, as is the case in this study. Factors that are measured in larger numbers will contribute more to the distance than factors that are recorded in smaller numbers. This problem was circumvented in this study by expressing all the factors in standardized form.

Three groups of farm households were identified by cluster analysis (Fig. 2), losers ($n=40$), winners ($n=56$), and economic winners ($n=36$). The groups were compared with regard to their SIA (SE and SC) of FWSP, access to water resources, level of participation in FWSP process, floodwater information, level of ownership changes, and environmental worldview scores. A brief description of groups and consistency of their attitudes with regard to the theoretical model will be presented.

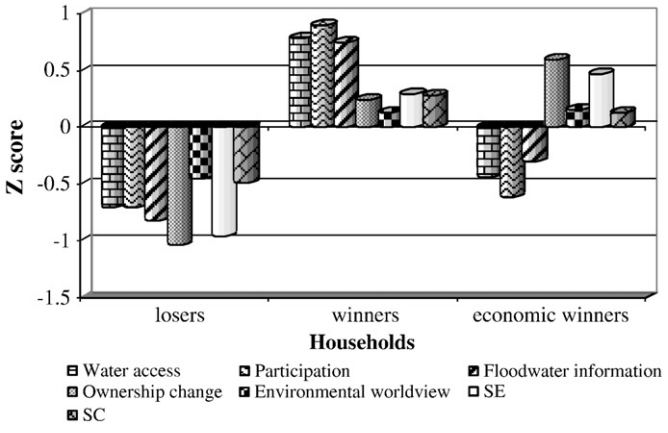

Fig. 2. Classification of households based on theoretical model.

4.4.1. Losers

This group of farm households had negative land ownership changes and limited access to water resources. Because of the FWSP, they were deprived of the right to control their dry farming land and rangeland. Furthermore, they had low access to agricultural water resources (Fig. 2). Due to experienced deprivation, these farm households have conflict with experts and agricultural organization regarding Gareh-Bygone FWSP. They also had limited participation in FWSP and also had limited information regarding floodwater spreading (Fig. 2). This group of farm households is anthropocentric and believes that the project has very negative social impacts. These findings are consistent with the expectation that farm households who have experienced negative consequences with regard to land ownership and have low level of information and participation in FWSP are not expected to have developed favorable attitudes toward social impact of the project.

4.4.2. Winners

This group is identified by high positive land ownership change. They profited from the FWSP. They obtain irrigated farming land almost illegally and improved their quality of life. Furthermore, their participation in floodwater spreading project and information regarding floodwater spreading were above the average (Fig. 2). This group has benefited the most from the project. This group is eco-centric and believed that the project had positive social impacts. As expected, this group who gained the most from the project assessed the FWSP to have positive impacts.

4.4.3. Economic winners

While this group had a low water access and also low level of information and participation in FWSP, they had high positive change in their land ownership during the project. This group of farm households is eco-centric too (Fig. 2). They evaluate the socio-economic impacts of the FWSP at highest level among all the three groups. The socio-cultural impact assessment by this group was above average, but less than the winners group.

5. Conclusions and recommendations

Although the social aspect is an important dimension of sustainable development, it has often been neglected in the planning of agricultural development projects. Consequently, ADPs have faced numerous social challenges such as growing dissatisfaction amongst rural peoples, negative attitudes towards the projects, conflicts over projects, and in some instances project failure. Although, ideally, the ultimate goal of ADPs is to ensure a better living for local people, often in practice there are serious social issues created by these projects that severely affect the intended outcomes. There is no doubt that the social aspects are as important as the environmental and economic aspects of development projects in the agricultural sector.

This research identified the fundamental factors that were the key determinants of attitude formation regarding the social impacts of FWSP. The results revealed that although the FWSPs had significant economic benefits, the social benefits were limited. Among the determinants considered in the model, "structural factors" that include irrigated area under farm household management, amount of farm household land ownership changes, and location were among the important factors in forming the socio-economic impact assessment of FWSP. However, the personal filter that were measured using the level of religious and spiritual values, attitude of households' reference group toward FWSP, and environmental worldview were among the important factors in explaining the socio-cultural impact assessment of the project. Findings indicated that among the variables

postulated in the model to explain households' socio-economic impact assessment, only level of education, level of participation in FWSP, ownership changes, and type of village had a significant impact. In addition, only attitude of reference group toward FWSP, and religious and spiritual values had a significant influence on perception of households regarding socio-cultural impact assessment of the project.

Overall, the theoretical framework of this study was able to explain a small percent of variability in social impacts of the FWSP as perceived by households. Accordingly the key determinants of SIA of FWSP were not identified clearly. Therefore, a cluster analysis was used based on factors which were presented in the theoretical model in order to better identify the key determinants of SIA of the project. Classification of households revealed that three groups could be identified:

1. Losers group: Farm households of this group had negative land ownership changes and limited access to water resources. They also had limited participation in FWSP. This group has assessed the project negatively. The households in this group believed that the project declines both socio-economic and socio-culture dimensions in the plain.
2. Winners group: Farm households in this group are identified by high positive land ownership change. They profited from the FWSP. The participation of this group in FWSP was above average. They had positive attitude toward social impacts of the project. Therefore, this group evaluated the project more positively in terms of socio-economic and socio-culture dimensions.
3. Economic winners: While this group of farm households had a low participation and information in FWSP, they have the highest positive changes in their land ownership during the project. They evaluate socio-economic impact of the FWSP at highest level among all the three groups.

The results from the cluster analysis suggested that the level of floodwater information, level of participation, water access, ownership change, and environmental worldview were the key determinants of SIA of the project. If these factors received sufficient consideration in an ADP's planning and implementation, appropriate SIA and consequently social sustainability in project areas could be expected. Therefore, these findings taught that development programs will be successful in terms of social sustainability when the essential following factors come into alignment in process of project planning and implementation:

- Since the findings showed that the losers had negative social impact assessment toward the FWSP, it is very essential to have no loser or at least reduce the number of losers as much as possible during the project's cycle. Fairness should be considered for all projects' stakeholders. In other words, the benefits and costs of projects should be equally distributed among different stakeholders and no one in projects should be a pure loser.
- Improving information and knowledge of rural communities regarding projects' life cycle, their benefits and costs in short and long-terms, and about the distribution of these costs and benefits is an important and essential stage of implementing any FWSP. Social conflicts and dissatisfactions will be reduced by this clarification (Ahmadvand and Karami, 2007).
- Local people should play the main role in the process of project planning and development. Much has been written about the value of local participation for all stakeholders, particularly in bringing local values and social objectives to the decision-making process and promoting social sustainability. Furthermore, the effort of conducting a proper local participation exercise will be rewarded, because enhancing the capacity of rural communities to fully participate in decision-making will generate buy-in the project and social capital which, in the long run, will reduce costs. In other words, this finding of the study in a way of social sustainability encourages participatory program planning in agricultural sector.
- It is very essential to have minimum changes (specially negative changes) in local communities' ownerships during the projects' cycle. Negative ownership changes result in social un-sustainability.
- Finally, one of the causes in social un-sustainability of development project is due to lack of local communities access to resources during development projects. Therefore, it is suggested to improve diversity of access to resources in the projects.

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