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Gendered Perceptions for Identifying Ecosystem Services in the Arid Ecosystem of Wadi Araba in Jordan

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Abstract

This study aimed to explore how ecosystem services (ES) identification varies among the local communities based on gender perceptions, considering the differences in usage and access to natural resources. We conducted research through two methods; focus groups and personal interviews. Four focus groups were formed in four communities in Wadi Araba (WA), Southern Jordan. A structured face-to-face interview method was used to evaluate a random sample of 200 residents. A binary logistic analysis was conducted to explore how the respondent's gender is seen to influence the type and use of services, and their perceptions of services in an arid ecosystem. The analysis generated three models; the first model showed that women were able to recognize and use provisioning services related to livestock production as they use rangeland for grazing for long periods and long daily hours, and the second model results reflected those women were able to recognize few ES. The identified services were linked to income-generating activities for a long time. The third model indicated that men were more likely to recognize and indicate the establishment of government services in support of the region as a result of the thriving and developed tourism sector.

Keywords: gender; ecosystem; binary logistic regression; wellbeing; equity.

JEL Classification: Q57; Q56; J16.

Introduction

Gender has not received any attention in the abundant literature on 'ecosystem services' (ES) that have been published since the appearance of the Millennium Ecosystem Assessment in 2005 (Schreckenberg *et al.* 2018; DAW *et al.* 2011; Yang *et al.* 2018). Cruz-Garcia *et al.* (2019) reviewed 462 papers on ecosystem services and wellbeing. They found that only five out of 49 case studies that focused on gender have identified gender as a 'blind spot' in ecosystem services research.

Gender is an important moderator of human perceptions and interaction with their surrounding environment. Several studies have shown gender differences as often influencing the environmental resources use, knowledge, management, access, and control (Meinzen-Dick *et al.* 1997; Westermann *et al.* 2005; Dovie *et al.* 2008; Rocheleau and Edmunds 1997; Sunderland *et al.* 2014; PROFOR; Yang *et al.* 2018; Mensah *et al.* 2017; Dan *et al.* 2021; Zoderer *et al.* 2016; Calvet-Mir *et al.* 2016; Githiora-Murimi *et al.* 2022). Studying gender lenses perceptions and interaction with their different surrounding ecosystems improve ecosystems' assessment and valuation (Schreckenberg *et al.* 2018).

The failure of including gender in ES valuation, access, and use contribute to conservation, management, and development interventions that do not meet the interests and perspectives of both men and women and unintentionally reinforce prevailing power differences (*i.e.*, strengthening the power of certain groups and diminishing the power of others excluded from the studies).

1. Research Background

In terms of ES analysis, multiple studies have shown differentiation of gender perception, access and use of provisioning ES such as food and medicinal plant (Jefferson *et al.* 2014; Singh *et al.* 2014; Santana *et al.* 2016; Díaz-Reviriego *et al.* 2016a; 2016b) and cultural ES such as recreation and tourism (García-Llorente *et al.* 2016; Swapan *et al.* 2017). Thus, the inclusion of gender differences is vital to achieve sustainable development and avoid environmental and economic consequences (Leach 2015). Therefore, is it important to focus on gendered environmental perceptions especially in developing countries where gender roles are generally defined (Juma 1998) and gender inequalities are generally more widespread (Andeltová *et al.* 2019).

Latest studies (*e.g.*, Calvet-Mir *et al.* 2016, Paing *et al.* 2022) had emphasized that considering gender in ES assessment and valuation contributed to policies more effective in enhancing ecosystem services provision. This is particularly important with the study area of this research "Wadi Araba" (WA), Jordan; an area of 6,900 km^2 desert environment that extends 170 km from the southern Dead Sea shore (elevation of 400 m below sea level) to the Gulf of Aqaba at the Red Sea (130 m above sea level), and constitutes 2.4% of the total area of Jordan (Nawash *et al.* 2011) with a total population of 6,800 people.

Within the Arab region and the study area of this research "Wadi Araba", only one research paper has highlighted the gender differences of perceptions of forest ES in northern Jordan (Al-assaf *et al.* 2014). While few studies have investigated the ES WA (Sagie *et al.* 2013; Orenstein and Groner 2014), none of them have highlighted the gender dimension of ES of humans interacting with the environment. The local studies on ES value in arid areas (*e.g.*, WA) demonstrated that this arid land harbors many valuable genetic plant resources which can be used for many purposes, including food, feed, energy, aesthetics, fiber, and medical. However, the ecological sustainability in that area (*e.g.*, WA) had been hampered due to climate change and local communities' activities in the southern part of Jordan **(**Nawash *et al.* 2011; Nawash *et al.* 2014; El-Naqa *et al.* 2009; Alassaf *et al.* 2011; Rozzi *et al.* 2015).

The previous national studies concluded that decreasing amounts of rainfall and high variations in precipitation from year to year have affected agricultural activities of local communities and imposed additional stress on the ESs of the arid environment. Moreover, the threats faced by the communities' livelihoods have grown because of unsustainable practices in hunting, overgrazing, and tourism. Such practices had placed a high strain on natural resources. The complex interaction between ecology and humans has highlighted the need for constructing policies for the sustainable provision of ESs in this area. Therefore, a gendered analysis of local community perception of ES with WA provides a useful understanding of conservation and development initiatives with the area.

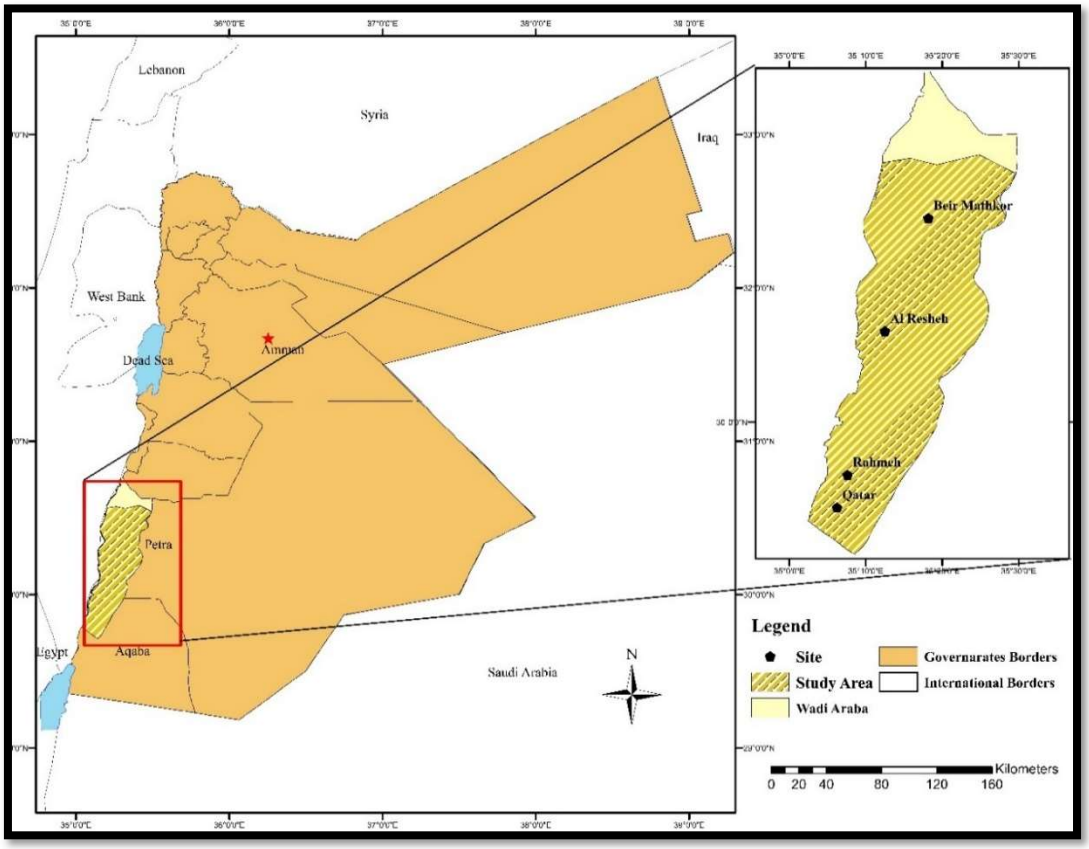
The overall objective of this study is to explore how ecosystem services ES are gendered in arid areas in terms of use, access, and how men and women benefit from the ecosystem. Therefore, the hypotheses of the study are; (1) ES are recognized and identified by the local communities in arid areas, and (2) ES identification varies among the local communities based on gender perceptions, considering the differences in usage and access to natural resources. To our knowledge, this is the first study that investigates the gendered perception of ES within WA in southern Jordan. Based on the hypotheses presented above, we set out to answer specific research questions:

- What are the identified and perceived supply of ESs by the local communities?
- How is gender shaping the ES perceptions of WA as an arid ecosystem in a developing country in the middle east?

2. Methodology

Wadi Araba is located in the southern part of Jordan; it is identified as an arid environment that covers 2000 km^2 that extends 170 km from the southern Dead Sea to the Gulf of Aqaba at the Red Sea with substantial diversity in elevations (Nawash *et al.* 2011). Wadi Araba is close to Aqaba which is considered a recreational venue for citizens from other cities in Jordan (El-Naqa *et al.* 2009), forming an integral part of Jordan's Golden Tourism Triangle. Tourist highlights of the region include the natural and man-made wonders of Petra, the desert and cliffs of WA, and the stunning coral reefs in Aqaba itself.

Figure 1. Map of the study area, south of WA



Source: (NARC Environment and Climate Change Research Directorate 2020)

Even though WA is nearby Aqaba city, which is the only coastal city in Jordan, the WA region suffers from surface water scarcity due to low rainfall rates and spatial fluctuations. The region is also characterized by the absence of valleys or torrents of permanent flow in the region. The amount of floodwater for all valleys and torrents in the WA region is about (8) million cubic meters annually.

Wadi Araba consists of seven large communities, which form a population of 10,760 people living in 2004 households; moreover, WA is a part of the famous Jordan's Golden Tourism Triangle that includes Aqaba and Petra cities (Department of Statistics). Due to low rainfall rates and the absence of valleys and torrents of permanent flow in the region, WA is recognized among the water poorest surface water areas in Jordan. Most of the population works in agricultural activities, grazing livestock, and touristic activities, besides in limited government jobs (Ministry of Interior Affairs 2019).

This study covered four locations in the southern part of WA; Rahamh, Qatar, Al-Reshah, and Beir Mathkour (Figure 1). These four sites account for more than 50% of the WA population and consist of diverse ESs. The total population of the study sites is about 5,459 people, and the total number of households is 820, with an average family size of 6–7 people per household (Ministry of Interior Affairs 2019).

Two methods were used to collect data on the perceived ES in WA; first, through conducting focus groups in study four selected sits, second, the data of the gendered perceptions of ES were collected through a structured survey. These data were collected from November 2019 till March 2020.

Data on the perceived ES in WA were collected through conducting three focus groups in 2019; two focus groups in Al-Reshah, and Beir Mathkour, and one focus group in Rahamh and Qatar. These focus group sessions were conducted as a part of larger workshops to introduce the project to the local communities and to identify the perceived ES in WA and the role these services play in alleviating poverty and enhancing living conditions. These workshops included a brief introduction to the importance of WA in terms of biodiversity and associated ES, followed by an exercise for identifying ES in the study sites. The overall three focus groups included 42 participants representing different government ministries, law enforcement, municipalities, health centers, youth and women centers, community-based organizations, and local authorities' members, 22 of which were female participants (52.4%) that were mainly governmental employees, housewives, or retired.

Data on the gendered ES perceptions of WA were identified through a structured survey. The data were collected between November 2019 to January 2020, including the pre-survey and the formal investigations. A random sample of 200 respondents was targeted in the survey, reflecting equal proportions of men and women. The sample size was defined through a multistage cluster sampling technique to select households proportionally to the number of households in each community. There was no specific profile for selecting respondents beyond their gender and their willingness to participate in this study. The face-to-face method was used in the respondent's interview, and each respondent provided written consent to participate in the field study, based on the ethical approval granted by the National Agricultural Research Center (NARC) and the University of Jordan to conduct the study according to the general regulations in both institutions.

The structured questionnaire was designed to capture the information and opinions of respondents on the ESs of WA, which included two parts; part 1 covered the demographic information of the respondents, such as gender, age, education, occupation, income, and family size. The second part focused on residents' detailed benefits and interaction with the surrounding provisioning services and cultural services. Based on the structured questionnaire, the provisioning ES were identified as perceived by the gender of the respondent by asking direct questions on livestock ownership, practicing open grazing, grazing period in a month, and daily hours, besides perception on the changes in the grazing area. The plant production was also identified by investigating the targeted local community's dependence on plant production, annual revenue derived from plant production, and perception of changes in plant production. Other provisioning ES perceived by the study sample were measured by the sample perceptions of wild and edible plants, complete disappearance of plants, plant cover, and the dependence on collecting firewood. On the other hand, the perceived cultural ES was identified by measuring available practiced activities related to cultural ES such as camping, photography, dunes, hunting among others.

The results of the focus groups and respondent's surveys were classified based on gender and then analyzed through regular descriptive frequency tests. These ES were grouped into two clusters:

(1) Cultural ES; ecotourism, natural views, cultural sites, medical tourism, educational services, and sports;

(2) Provisioning ES; agriculture, livestock, biodiversity, industries, water springs/dams, hunting, traditional food, and beekeeping.

Afterward, the binary logistic analysis was applied to explore the role of gender in identifying and utilizing ES. The binary models usually are used to determine the factors influencing specific group decisions and opinions and, in this research, the respondent's gender is seen to influence the type, use, and perceptions of services in an

arid ecosystem. In other words, being a man or woman will affect how a person identifies, uses, and perceive services found in the area, so the dependent variables in this model were about being a man (coded as 1) or being a woman (coded as 2). The explanatory variables were selected based on how these variables were significantly correlated to the gender factor. Statistical Package for the Social Sciences (SPSS version 19) was used for all statistical analyses.

3. Results and Discussion

In general, respondents, both men, and women were asked to identify and state perceptions and in some cases estimations, about most of the known provisioning and cultural ecosystem services in the study area. Moreover, respondents were asked to provide a perception of ecotourism activities and their impacts on the region. In general, the gender factor did not have a clear-cut effect on all tested ES, and to determine the most important services in which differences were found from the gender point of view; only services of statistical differences will be presented and discussed in this section.

3.1 Perceived Ecosystem Services through Gender's Focus

Male and female respondents in workshops reflected no difference in recognition of the cultural ES (Fig. 2a). Male respondents have identified ecotourism activities, medical tourism, and natural views as the most recognized cultural ES's in WA, while women identified the same ES in addition to the cultural sites within WA. Eco-tourism activities and cultural sites were the most perceived cultural ES by male and female representatives from participants from public and private sectors, and those from community-based organizations (CBOs) working in tourism and WA Development Company. Medical tourism was perceived as the second important cultural ES according to the representatives working in state institutions.

On the other hand, there were differences among male and female respondents in identifying the provisioning ES's (Fig. 2b). Male respondents mainly identified agriculture, biodiversity, livestock, and nature-based industries as the most recognized provisioning ES in the area, while women identified similarly but a wider range of ES such as water springs and dams and the production of traditional food, besides the same ES recognized by men. However, within the activity of nature-based industries, women have given this ES higher importance compared to men which was attributed to the fact that women were the actual producers of such handmade products. As for the water provisioning from water dams and springs and the production of traditional food, these ES were solely indicated by women as they rely on water resources for daily home responsibilities (cooking, cleaning, etc.) and on the traditional food production for household consumption or/and selling purposes.

Figure 2a. Perceived Cultural ES of WA by Gender Focused Groups

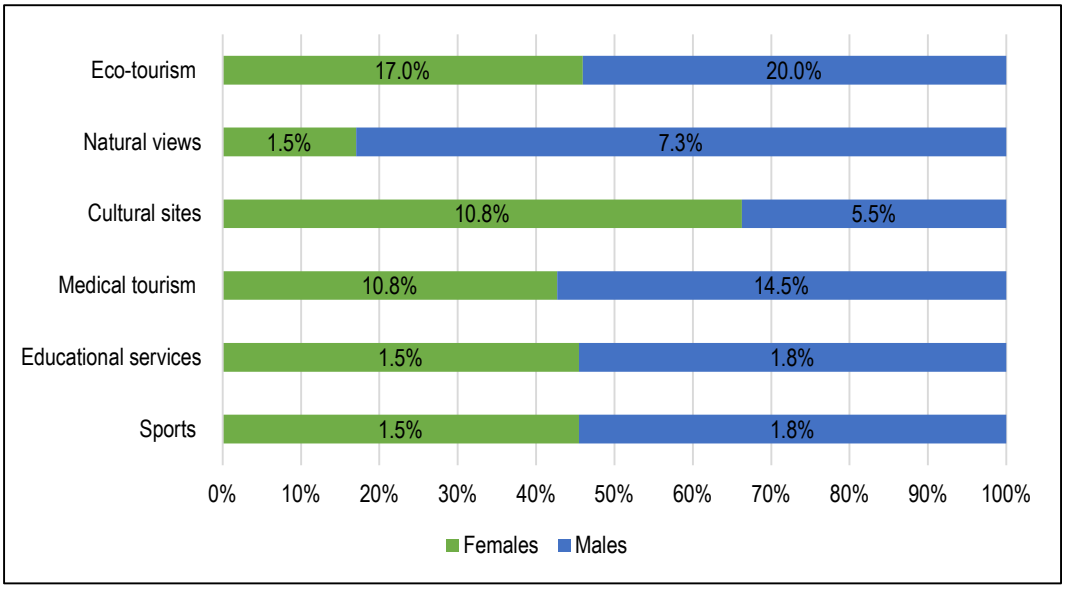
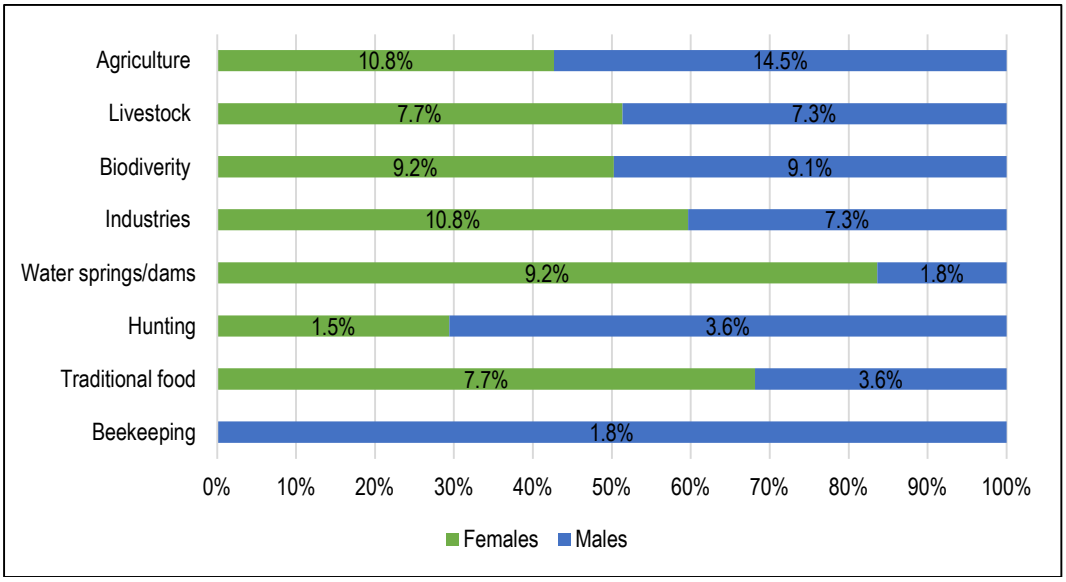


Figure 2b. Perceived of provisioning Services of WA by Gender Focused Groups



Agriculture was the most acknowledged provisioning ES by male and female participants, while biodiversity, on the other hand, was perceived as the second important provisioning service according to the focus groups. Finally, mining industries were recognized for their great potential by different participants from the public and private sectors.

3.2. Characteristics of Survey Respondents

The Characteristics of respondents were investigated according to the following criteria:

- Gender; Male or Female.
- Age classes; 18-30 years, 31-45 years, 46-60 years, and older than 61 years.
- Levels of education; finished class or illiterate.
- Levels of monthly income (JOD[1]); less than 100 JOD, 100-350 JOD, 351-500 JOD, 501-999 JOD, more than 1000 JOD.

The characteristics of the respondents displayed age and income structures that were generally similar to census data by Al-Assaf *et al.* 2021. Most of the respondents were male representing 53.5% of the sample, mainly aged between 31-60 years old (73.0%) while the respondents of younger ages (18-30 years old) represented only 16.5% of the sample. The majority of these respondents (79.0%) had income in the range of JOD 100-500, which is reflected in the classification of WA as one of the poorest communities in Jordan, while only 1% of the sample has an income above JOD 1000. As for the educational level, 55.0% of the respondents of the study sample have completed the 9th grade and the rest are illiterate (34.5%).

3.3 Gender Perceptions about Main ES

The results of the survey reflected equal involvements of men and women in activities of animal and plant production, besides participating in other activities of provisioning ES such as firewood collection, wild and edible plants (Table 1). There were, however, some differences in the degree to which men and women use the provisioning ES. First, women own more livestock nowadays compared to men as stated by 51% of the female respondents. Second, as a source of fodder for the livestock flocks, women spend about 8.3 hours on daily grazing than men. This pattern is reflected in the average monthly grazing period as women tend to adopt the open grazing method for a longer time (8.09 months, ±5.308) compared to men (3.95 months, ±2.480). However, 49% of men were more likely to observe changes in the grazing area than women did.

On the other hand, women remained to have relatively a higher involvement in plant production compared to men, as 19% of the women were more dependent on plant production compared to 11% of men, still, women expressed higher negative changes in the plant production as stated by 29% of the sample (Table 1). Both men and women shared the same reasons for explaining the changes in plant production in WA, and the three top reasons were: high costs of production (men 20%, women 27%), changes in the rainy season (men 11%, women

[1] Exchange rate (as of January 2022): 1 USD= 0.708 Jordanian Dinars (JOD).

23%), and land reform projects (men 17%, women 6%), and the last reason reflects the restrictions imposed on using the rangeland for uncontrolled grazing.

Table 1. Gender Perceptions on Selected Ecosystem Services in Southern WA

	Gender	
	Men	Women
Provisioning services as gender perception		
Animal's ownership (Sheep, goats, and camels) %:	46	51
Follow open grazing approach %	42	29
Grazing period (Average months (± standard deviation))	3.95 months (±2.480)	8.09 months (±5.308)
Grazing daily (Average daily hours (± standard deviation))	7.09 hours	8.33 hours
Perception on the changes in plant density in the grazing area %	49	27
Depend on plant production %	11	19
Perception of changes in plant production: positively % negatively %	 16 13	 11 29
Collect and use firewood %	76	50
Perception of the presence of wild medicinal and edible plants %	89	75
Perception of complete disappearance of some plants %	58	28
Perception of change in plant cover in the last 5 years: decrease %	79	58
Gender perception on the availability of some cultural services		
Camping is available in the area %	40.6	59.4
Mountain climbing is available in the area %	37.0	63.0
Sand Dunes is available in the area %	49.5	50.5
Waterfalls are available in the area %	20.6	79.4
Historic sites/museums are available in the area %	25.5	74.5
Perception of ecotourism contribution to		
The investment promotion (scale average (± standard deviation))	1.89(±0.57)	1.56 (±0.61)
The establishment of government services in support of the region	1.83(±0.63)	1.61(±0.69)
The diversifying income sources for local people	2.00(±0.64)	1.58(0.632)

However, men reflected higher understandings of the biodiversity and changes in the plant cover and changes in the provisioning services such as firewood and medicinal and edible plants (Table 1). Seventy-six percent of the men's respondents reflected a higher dependency level on the collected firewood and medicinal and edible plants. Besides, 58% and 79% of men perceived a complete disappearance of these plants and the changes in plant cover in the past 5 years, respectively.

Moreover, all respondents, both men, and women reported that the most important cultural services in their area are camping, mountain climbing, dunes, waterfalls, and historic sites were the most available services in this region and utilized in different ecotourism activities. In general, men were able to identify these services more than women, especially climbing, identifying locations of waterfalls, and the historic sites in this region. This probably referred to the fact that women in this study area are more dwelled into indoor activities such as household chores, food production, etc. Later on, respondents were asked to value the impact of such ecotourism activities on three aspects; investment promotion, the establishment of government services in support of the region, and diversifying income sources for local people. The valuation was based on a scale of 5 levels (Likert scale); from 1= extremely disagree to 5= extremely agree. There were obvious differences in perceptions among men and women (Table 1); both groups reflected the negative impact of ecotourism activities on the ecosystems and the region.

3.4 Gendered ES: How He and She Recognize ES

The Pearson correlation analysis (Table 2) showed that some of the perceived provisioning and cultural ES had a strong bivariate relationship with gender. Provisioning ES represented by the respondent's perception of changes in the grazing area and perception of the complete disappearance of some plants were found to be positively correlated with gender ($p<0.00$) and thus it was recognized more by men than women. This reflects the extinction situation of some important wild medicinal and edible plants that were recognized in this unique ecosystem. Other provisioning ES related to animal production and the uses of natural fodders, were explored by factors of daily grazing hours (daily hours) and grazing seasons (months), which were negatively correlated with gender ($p<0.00$). This result elucidated the fact that flocks of livestock owned by women are more likely to spend more hours and

months in the grazing areas, from women's point-view, this reduces the cost of fodders, but definitely, reflects the weak experience of women in rangeland management. The respondents' dependence on plant production, annual yield of plant production, and perception of the changes in plant production, on the other hand, were all statistically not correlated with gender ($p>0.05$).

Table 2. Correlation Analysis of Respondents' Gender and Selected ES

	Pearson Correlation	Sig. (2-tailed)
Animal and plants/provisioning services of rangeland system		
No. of daily grazing hours	-0.573**	0.000
Grazing seasons in months	-0.499**	0.000
There is a difference in the plant density of rangelands (% of yes answers)	0.252**	0.009
There is a complete disappearance of some plants (% of yes answers)	0.278**	0.000
Collect firewood (% of yes answers)	0.195**	0.007
Gender perception on the availability of some cultural services		
Camping is available in the area	0.347**	0.000
Mountain climbing is available in the area	0.216**	0.002
Sand Dunes is available in the area	-0.120	0.090
Waterfalls are available in the area	0.411**	0.000
Historic sites/museums are available in the area	0.398**	0.000
Perception of ecotourism contribution to		
The investment promotion	-0.233**	0.001
The establishment of government services in support of the region	-0.180*	0.012
The diversifying income sources for local people	-0.267**	0.000

The results from the correlation analysis had reflected the role of the gender factor in identifying specific cultural services and determining the individual perceptions of ecotourism's impact on the study area (Table 2). Several cultural services were significantly correlated with the gender's factor; camping, climbing, historic sites ($p<0.00$). The correlation of these cultural services was positively connected with gender factor, in other words, men are more likely to distinguish cultural services, however, none of the men nor women recognized dunes as one of the distinguished cultural services in this region ($p>0.05$). On the other side, respondents' gender had a negative and significant correlation ($p<0.00$) with their ranking of the contribution of ecotourism to investment promotion, the establishment of government services in support of the region, and the diversifying income sources for local people. Where it turned out that women had expressed a higher appreciation of the ecotourism activities for households' welfare and the region's development, while men were willing to obtain more positive contributions of ecotourism, as they mentioned that ecotourism is not efficiently developed and there are still higher potentials for ecotourism in this region.

The results from the binomial logistic models are presented in Table 3. The analysis consisted of three models that reflected gendered perceptions of the selected ecosystem services. The first logistic model performed well as indicated by the high value of the Omnibus test (χ^2, df, sig.= 61.97,5,0.00), besides, the goodness of fit for this model reflected a significant relationship between the gender perception and selected provisioning services related to animal and plant production in rangeland. The percentage of correct prediction was high as 87.1%, which means that explanatory variables were capable of explaining the gender perception of ecosystem services in the study area. This model reflected gender perception of provisioning services related to animals and plants in the rangeland system. The results of this model corroborated that woman is more likely to recognize and use provisioning services related to livestock production as they use rangeland for grazing for long periods and longer daily hours ($p<0.05$). This result indicates the extensive use of rangeland by female herders which reflects the low knowledge in rangeland management compared to men, usually, men herders use rangeland for grazing in specific and limited periods in the year and shorter periods compared to women herders. This is also articulated by the second factor; as women were unlikely to realize the change in plant density in the rangeland, as there were differences in the density of rangelands ($p<0.05$). On the other side, the perception about the complete disappearance of some wild plants was more likely to be stated by men ($p< 0.05$), which explained the previous results, as this model reflected the ability of men to distinguish important provisioning services.

Table 3. Parameters Estimation from the Binomial Logistic Regression Model Predicting Gender Perception of Selected Ecosystem Service

Explanatory variable	Coeff.	S.E.	Wald	Exp. (B)	Model summary		
					Omnibus test of model coefficients	Nagelkerke R^2	% of correct predictions
Animal and plants/provisioning services of rangeland system							
No. of daily grazing hours	-3.25**	1.25	6.70	0.04	χ^2 = 61.97 Df = 5 Sig =0.00	0.85	87.1
Grazing seasons in months	-0.50**	.210	5.83	0.60			
There are differences in the density of rangelands (% of yes answers)	-4.11**	1.99	4.24	0.02			
There are a complete disappearance of some plants (% of yes answers)	4.91**	2.08	5.54	135.86			
Collect firewood (% of yes answers)	3.62	4.85	0.55	37.34			
Constant	23.66**	10.36	5.21	1.89*10			
Gender perception on the availability of some cultural services							
Camping is available in the area	-2.13***	0.71	8.89	0.11	χ^2 = 68.86 Df = 5 Sig =0.00	0.39	76.8
Mountain climbing is available in the area	-0.179	0.39	0.21	0.83			
Sand Dunes is available in the area	2.13***	0.69	9.37	8.46			
Waterfalls are available in the area	-1.05**	0.47	4.92	0.34			
Historic sites/museums are available in the area	-1.27**	0.39	10.55	0.28			
Constant	1.74***	0.34	25.14	5.71			
Perception of ecotourism contribution to							
The investment promotion	-1.19**	0.54	4.73	0.30	χ^2 = 26.43 Df = 3 Sig =0.00	0.17	63.0
The establishment of government services in support of the region	1.06**	0.49	4.71	2.89			
The diversifying income sources for local people	-1.02***	.358	8.12	0.36			
Constant	2.16***	0.522	17.23	8.74			

S.E. corresponds to standards error;

* Significance level: 10%; ** Significance level: 5%; *** Significance level: 1%.

The second logistic model expressed gender perception on the availability of some cultural services; camping, climbing, waterfalls, dunes, and historic sites. This model performed very well as the Omnibus test was significant (χ^2, df, sig.= 68.86,5,0.00), and the percentage of correct prediction of this model was high 76.8%, which reflect the role of gender perception in distinguishing cultural activities in the region. The gender factor has a substantial role in identifying the cultural activities in this region. The results presented by this model reflect how gender, men, and women, identify and perceive different cultural services in the study area. Women were more likely able to recognize only the availability of camping ($p< 0.00$), waterfalls, and historic sites ($p<0.05$). The identified services were linked to income-generating activities for a long time.

The third logistic model explored how gender has different perceptions of ecotourism contribution to different aspects in the region. The model was relatively well, as the Omnibus test was significant (χ^2, df, sig.= 26.43,3,0.00), and the correct prediction was about 63%. The results indicated that women were more likely to declare how ecotourism contributed to investment promotion ($p<0.05$) and the impact of ecotourism in income diversification ($p <0.00$) by providing different job opportunities to the local community as a result of ecotourism activities in the study area. Moreover, men were more likely to recognize and indicate the establishment of government services in support of the region ($p<0.05$) as a result of the thriving and developed tourism sector.

This research study adds additional evidence that ES are perceived as uneven and unneutral between gender (Schreckenberg *et al.* 2018; Mengist etal.2022). The results showed that both men and women in WA identified and valued the same ESs differently though they shared some of the criteria for valuing prioritized services. In this regard, for example, both men and women groups had identified several provisioning services (*i.e.* agriculture, livestock, biodiversity, and industries) as well as other cultural services (*i.e.* eco-tourism, natural views). These cultural ES's, which are strongly associated with tourism, are attributed to WA's near close location to Aqaba and Petra cities, the growing tourist attractions in Jordan.

Men and women agreed that a particular ES is important for the study area but different reasons and diverse perceptions, men are more likely to perceive and value ESs than women (Hartter 2010; Orenstein and Groner 2014; Schreckenberg *et al.* 2018; Mengist *et al.* 2022), although limited cases showed the opposite (Calvet-Mir *et al.* 2016; Shen *et al.* 2015). These findings emphasize the importance of considering and integrating the gender approach for ES valuation and priority setting, as both men and women did not identify or use ES similarly; and suggest that assessments of ES or designed development projects in WA need to take these gender differences into account.

Both groups of men and women expressed differences in the perceptions and appreciation of provisioning services and cultural services, and that can be arguably linked to household and cultural roles assigned on gender bases. Some studies reported that men and women value and use different ES based on different criteria of importance. For instance, men gave higher relative importance to provisioning services, while women appreciated the regulating services (Martín-López *et al.* 2012; Oteros-Rozas *et al.* 2013, Lefeuvre *et al.* 2022), and in other studies, women appreciated firewood as a provisioning service while men appreciated wood for constructions (Tadesse *et al.* 2014). Few studies presented how women appreciated cultural services (eco-tourism activities as services) more than men regarding recreation and enjoyment (Anthony and Bellinger 2007; Plieninger *et al.* 2013; Cruz-Garcia *et al.* 2019, Schirpke *et al.* 2022), which is a finding that women appreciated more than men (Table 2 and Table 3).

Both -men and women- expressed differences in the level of perception of ES that exists in WA. Women were more likely to identify and use rangeland for grazing and observe changes in rangeland (Table 3), this has shown that women have strong dependencies and relation with the surrounding environmental sources, in particular, the open-access resources and common land (Schreckenberg *et al.* 2018; Schirpke *et al.* 2022). The gender factor affects the perception of provisioning and cultural services. Women provided independent and distinctive perceptions about the sustainability of ES in WA as an arid ecosystem (Table 2 and Table 3).

This study suggested that the similarities and differences in the way men and women value and use ES were related to the social-ecological system and the specific context of the arid region as WA. Also, the criteria used by men and women to value and appreciate diverse ES varied across the social and cultural environments. Thus, the study results endorsed the importance of integrating gender as a major component of ES assessments and evaluation studies (Schreckenberg *et al.* 2018; Yang *et al.* 2018, Githiora-Murimi *et al.* 2022), whereas the gender perceptions have been reflected in each environmental activity for deriving benefits from ecosystems (Ravera *et al.* 2016). For instance, gender roles were known to influence the use, conservation, and restoration of vegetation cover (Mensah *et al.* 2017; Palliwoda *et al.* 2017; Swapan *et al.* 2017; Singh *et al.* 2022). Gender factor was also known to influence the activity of wild plants collection that is gathered and valued by women (Al-assaf *et al.* 2014; Santana *et al.* 2016; Díaz-Reviriego *et al.* 2016a; Porcher *et al.* 2022). Besides that, this study emphasizes the important role of gender in practicing multiple activities such as herding and plant production and their influence in utilizing the multiple ecotourism activities by both men and women (Martín-López *et al.* 2012; Mensah *et al.* 2017).

Conclusions

This study is recognized as the first to explore the gender perceptions on ES within local communities in arid environments. Both men and women identified a range of provisioning and cultural services, about two out of the main four categories of ES presented by the research society. However, they were skewed towards provisioning services to the extent of few cultural services (eco-tourism activities) were mentioned heavily. Therefore, both -women and men, had perceived tangible services which are more related to direct agricultural production and direct nature benefits. This reflects a concern that if nothing is done to raise awareness for both genders, there is a risk that more people will pay less attention to the conservation of the arid ecosystem. In this case, men and women will be not equivalently involved in any development plans and rehabilitation programs.

This paper showed that differences in women's and men's perceptions are recommended to necessary assessments of gender's perception of ES related to their livelihood. Using a gender lens to study ES helped us to

understand which ES men and women value, which services they use that contribute to their wellbeing. In the case of having similar services across gender, the conservation plans and development projects will be designed to focus on these services that are most important to the overall community. But in their situation, where men and women depend on and value different services, development projects will design to better target their interventions to enhance the wellbeing of all.

Further investigations are needed to explore ES interaction with many factors associated with community livelihoods like; location, income, age, domestic roles, and natural resource stocks. For instance, how did men and women respond to conservation projects that are designed to favor ES that is appreciated differently across gender? How can the project managers go through trade-offs and negotiations with local people with gender lenses? And finally, additional investigation is needed to reflect the gender dimensions in environmental governance.

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References:

[1] Al-Assaf, Amani, *et al.* 2021. Local Communities' Willingness to Accept Compensation for Sustainable Ecosystem Management in Wadi Araba, South of Jordan. *Sustainability,* 13 (9): 5190. DOI:https://doi.org/10.3390/su13095190

[2] Alassaf, Amani, Mohamad Majdalwai, and Oraib Nawash. 2011. Review of Factors Affecting Farmers' Decision to Continue Farm Activity in Marginal Areas of Jordan. *African Journal of Agricultural Research* 6.

[3] Al-assaf, Amani, Oraib Nawash, and Mohammad Omari. 2014. Identifying Forest Ecosystem Services through Socio-Ecological Bundles: A Case Study from Northern Jordan. *International Journal of Sustainable Development & World Ecology,* 21 (4): 314–21. DOI: https://doi.org/10.1080/13504509.2014.919968

[4] Andeltová, Lucie, Delia C. Catacutan, Tobias Wünscher, and Karin Holm-Müller. 2019. Gender Aspects in Action- and Outcome-Based Payments for Ecosystem Services—a Tree Planting Field Trial in Kenya. *Ecosystem Services,* 35 (February): 13–22. DOI: https://doi.org/10.1016/j.ecoser.2018.10.004

[5] Anthony, Brandon P., and Edward Bellinger. 2007. Review of Importance Value of Landscapes, Flora and Fauna to Tsonga Communities in the Rural Areas of Limpopo Province, South Africa: Research Article. *South African Journal of Science,* 103 (3): 148–154. DOI: https://journals.co.za/doi/pdf/10.10520/EJC96656

[6] Boul Lefeuvre Nastasia, *et al.* 2022. The value of logged tropical forests: A study of ecosystem services in Sabah, Borneo. *Environmental Science & Policy*, 128: 56-67. DOI:https://doi.org/10.1016/j.envsci.2021.11.003

[7] Calvet-Mir, Laura, *et al.* 2016. Home Garden Ecosystem Services Valuation through a Gender Lens: A Case Study in the Catalan Pyrenees. *Sustainability* 8 (8): 718. DOI: https://doi.org/10.3390/su8080718

[8] Cruz-Garcia, Gisella S., *et al.* 2019. He Says, She Says: Ecosystem Services and Gender among Indigenous Communities in the Colombian Amazon. *Ecosystem Services,* 37 (June): 100921. DOI:https://doi.org/10.1016/j.ecoser.2019.100921

[9] Dan, Michelle E., *et al.* 2021. Desert Landscape Services: Insights from Pastoralist Communities in Northern Kenya. *Ecosystem Services* 48 (April): 101243. DOI: https://doi.org/10.1016/j.ecoser.2021.101243

[10] Daw, Tim, Katrina Brown, Sergio Rosendo, and Robert Pomeroy. 2011. Applying the Ecosystem Services Concept to Poverty Alleviation: The Need to Disaggregate Human Well-Being. *Environmental Conservation,* 38 (4): 370–79. DOI: https://doi.org/10.1017/s0376892911000506

[11] Díaz-Reviriego, Isabel, *et al.* 2016a. Gendered Medicinal Plant Knowledge Contributions to Adaptive Capacity and Health Sovereignty in Amazonia. *Ambio,* 45 (S3). DOI: https://doi.org/10.1007/s13280-016-0826-1

[12] Díaz-Reviriego, Isabel, *et al.* 2016b. Social Organization Influences the Exchange and Species Richness of Medicinal Plants in Amazonian Homegardens. *Ecology and Society,* 21 (1). DOI: https://doi.org/10.5751/ES-07944-210101

[13] Dovie, Delali B.K., E.T.F. Witkowski, and Charlie M. Shackleton. 2008. Knowledge of Plant Resource Use Based on Location, Gender and Generation. *Applied Geography,* 28 (4): 311–22. DOI:https://doi.org/10.1016/j.apgeog.2008.07.002

[14] El-Naqa, Ali, Nezar Hammouri, Khalil M. Ibrahim, and Masdouq Al-Taj. 2009. Review of Integrated Approach for Groundwater Exploration in Wadi Araba Using Remote Sensing and GIS. *Jordan Journal of Civil Engineering* 3 (3).

[15] García-Llorente, Marina*, et al.* 2016. What Can Conservation Strategies Learn from the Ecosystem Services Approach? Insights from Ecosystem Assessments in Two Spanish Protected Areas. *Biodiversity and Conservation,* 27 (7): 1575–97. DOI: https://doi.org/10.1007/s10531-016-1152-4

[16] Hartter, Joel. 2010. Resource Use and Ecosystem Services in a Forest Park Landscape. *Society & Natural Resources,* 23 (3): 207–23. DOI: https://doi.org/10.1080/08941920903360372

[17] Jefferson, R. L., *et al.* 2014. Public Perceptions of the UK Marine Environment. *Marine Policy,* 43 (January): 327–37. DOI: https://doi.org/10.1016/j.marpol.2013.07.004

[18] Joyce N. Paing, Lenny G.J. van Bussel, Romeo A. Gomez and Lars G. Hein. 2022. Ecosystem services through the lens of indigenous people in the highlands of Cordillera Region, Northern Philippines, *Journal of Environmental Management*, Volume 308, 114597, ISSN 0301-4797. DOI:https://doi.org/10.1016/j.jenvman.2022.114597

[19] Juma, Sahim Abdalla. 1998. Men, women and natural resources in Kwale District, Kenya. *AMBIO: A Journal of the Human Environment,* 27: 758-759.

[20] Leach, Melissa. 2015. *Gender Equality and Sustainable Development*. First Edition. Routledge.

[21] Martín-López, Berta, *et al.* 2012. Uncovering Ecosystem Service Bundles through Social Preferences. Edited by Kamal Bawa. *PLoS ONE,* 7 (6): e38970. DOI: https://doi.org/10.1371/journal.pone.0038970

[22] Meinzen-Dick, Ruth S., Lynn R. Brown, Hilary Sims Feldstein, and Agnes R. Quisumbing. 1997. Gender, Property Rights, and Natural Resources. *World Development,* 25 (8): 1303–15. DOI:https://doi.org/10.1016/s0305-750x(97)00027-2

[23] Mensah, Sylvanus, *et al.* 2017. Ecosystem Service Importance and Use Vary with Socio-Environmental Factors: A Study from Household-Surveys in Local Communities of South Africa. *Ecosystem Services,* 23 (February): 1–8. DOI: https://doi.org/10.1016/j.ecoser.2016.10.018

[24] Nawash, Oraib and Ahmad Al S. Horani. 2011. The most important medicinal plants in Wadi Araba desert in South West Jordan: a review article. *Advances in Environmental Biology*: 418-426.

[25] Nawash, Oraib, Amani Al-Assaf, Ahmad El-oqlah, and Mohammad Omari. 2014. Floristic Features, Distribution, and Ethnobotany of Plants Gathered and Used by Local People from the Mediterranean Forest in Northern Jordan. *Ethnobotany Research and Applications,* 12 (September): 385. DOI:https://doi.org/10.17348/era.12.0.385-396

[26] Orenstein, Daniel E., and Elli Groner. 2014. In the Eye of the Stakeholder: Changes in Perceptions of Ecosystem Services across an International Border. *Ecosystem Services,* 8 (June): 185–96. DOI:https://doi.org/10.1016/j.ecoser.2014.04.004

[27] Oteros-Rozas, Elisa, *et al.* 2013. Socio-Cultural Valuation of Ecosystem Services in a Transhumance Social-Ecological Network. *Regional Environmental Change,* 14 (4): 1269–89. DOI: https://doi.org/10.1007/s10113-013-0571-y

[28] Palliwoda, Julia, Ingo Kowarik, and Moritz von der Lippe. 2017. Human-Biodiversity Interactions in Urban Parks: The Species Level Matters. *Landscape and Urban Planning,* 157 (January): 394–406. DOI:https://doi.org/10.1016/j.landurbplan.2016.09.003

[29] Plieninger, Tobias, Sebastian Dijks, Elisa Oteros-Rozas, and Claudia Bieling. 2013. Assessing, Mapping, and Quantifying Cultural Ecosystem Services at Community Level. *Land Use Policy,* 33 (July): 118–29. DOI:https://doi.org/10.1016/j.landusepol.2012.12.013

[30] Porcher, V, *et al.* 2022. Growing up in the Betsileo landscape: Children's wild edible plants knowledge in Madagascar. PLoS ONE, 17(2): e0264147. DOI: https://doi.org/10.1371/journal.pone.0264147

[31] Priyatma Singh, Tammy Tabe and Tess Martin 2022. The role of women in community resilience to climate change: A case study of an Indigenous Fijian community, Women's Studies International Forum, 90, 102550, ISSN 0277-5395. DOI: https://doi.org/10.1016/j.wsif.2021.102550

[32] Ravera, Federica, *et al.* 2016. Gender Perspectives in Resilience, Vulnerability and Adaptation to Global Environmental Change. *Ambio,* 45 (S3): 235–47. DOI: https://doi.org/10.1007/s13280-016-0842-1

[33] Rocheleau, Dianne, and David Edmunds. 1997. Women, Men and Trees: Gender, Power and Property in Forest and Agrarian Landscapes. *World Development,* 25 (8): 1351–71. DOI: https://doi.org/10.1016/s0305-750x(97)00036-3

[34] Rozzi, Ricardo, *et al.* 2015. *Earth Stewardship Linking Ecology and Ethics in Theory and Practice*. Springer International Publishing.

[35] Sagie, Hila, *et al.* 2013. Cross-Cultural Perceptions of Ecosystem Services: A Social Inquiry on Both Sides of the Israeli–Jordanian Border of the Southern Arava Valley Desert. *Journal of Arid Environments,* 97 (October): 38–48. DOI: https://doi.org/10.1016/j.jaridenv.2013.05.007

[36] Santana, Bruna Farias de, Robert A. Voeks, and Ligia Silveira Funch. 2016. Ethnomedicinal Survey of a Maroon Community in Brazil's Atlantic Tropical Forest. *Journal of Ethnopharmacology,* 181 (April): 37–49. DOI: https://doi.org/10.1016/j.jep.2016.01.014

[37] Schirpke, U., R. Scolozzi, and U. Tappeiner. 2022. Not too small to benefit society: insights into perceived cultural ecosystem services of mountain lakes in the European Alps. Ecology and Society, 27(1): 6. DOI:https://doi.org/10.5751/ES-12987-270106

[38] Schreckenberg, Kathrin, Georgina Mace, and Mahesh Poudyal. 2018. *Ecosystem Services and Poverty Alleviation: Trade-Offs and Management*. First Edition. Routledge.

[39] Shen, Zhonghua, *et al.* 2015. Willingness to Pay for Ecosystem Services of Open Oceans by Choice-Based Conjoint Analysis: A Case Study of Japanese Residents. *Ocean & Coastal Management,* 103 (January): 1–8. DOI: https://doi.org/10.1016/j.ocecoaman.2014.10.016

[40] Singh, Ranjay K., *et al.* 2014. Paisang (Quercus Griffithii): A Keystone Tree Species in Sustainable Agroecosystem Management and Livelihoods in Arunachal Pradesh, India. *Environmental Management,* 55 (1): 187–204. DOI: https://doi.org/10.1007/s00267-014-0383-y

[41] Sunderland, Terry, *et al.* 2014. Challenging Perceptions about Men, Women, and Forest Product Use: A Global Comparative Study. *World Development,* 64 (December): S56–66. DOI:https://doi.org/10.1016/j.worlddev.2014.03.003

[42] Swapan, Mohammad Shahidul Hasan, Md Sayed Iftekhar, and Xiyuan Li. 2017. Contextual Variations in Perceived Social Values of Ecosystem Services of Urban Parks: A Comparative Study of China and Australia. *Cities,* 61 (January): 17–26. DOI: https://doi.org/10.1016/j.cities.2016.11.003

[43] Tadesse, Getachew, Erika Zavaleta, Carol Shennan, and Margaret FitzSimmons. 2014. Local Ecosystem Service Use and Assessment Vary with Socio-Ecological Conditions: A Case of Native Coffee-Forests in Southwestern Ethiopia. *Human Ecology,* 42 (6): 873–83. DOI: https://doi.org/10.1007/s10745-014-9704-2

[44] Westermann, Olaf, Jacqueline Ashby, and Jules Pretty. 2005. Gender and Social Capital: The Importance of Gender Differences for the Maturity and Effectiveness of Natural Resource Management Groups. *World Development,* 33 (11): 1783–99. DOI: https://doi.org/10.1016/j.worlddev.2005.04.018

[45] Wondimagegn Mengist, Teshome Soromessa, Gudina Legese Feyisa and G. Darrel Jenerette. 2022. Socio-environmental determinants of the perceived value of moist Afromontane forest ecosystem services in Kaffa *Biosphere Reserve, Ethiopia, Forest Policy and Economics*, 136, 102688. DOI:https://doi.org/10.1016/j.forpol.2021.102688

[46] Yang, Y.C. Ethan, Simone Passarelli, Robin J. Lovell, and Claudia Ringler. 2018. Gendered Perspectives of Ecosystem Services: A Systematic Review. *Ecosystem Services,* 31 (June): 58–67. DOI:https://doi.org/10.1016/j.ecoser.2018.03.015

[47] Yvonne Wambui Githiora-Murimi, *et al.* 2022. Integrating stakeholder preferences into ecosystem services mapping in Yala wetland, Kenya. *Ecosystems and People*, 18(1): 146-163.

[48] Zoderer, Brenda Maria*, et al.* 2016. Identifying and Mapping the Tourists's Perception of Cultural Ecosystem Services: A Case Study from an Alpine Region. *Land Use Policy,* 56 (November): 251–61. DOI:https://doi.org/10.1016/j.landusepol.2016.05.004

[49] Department of Statistics. Estimate Number of The Population of Aqaba Governorate by, Locality, Sex&families Size, and households for the end of 2020. Available at: http://dosweb.dos.gov.jo/DataBank/Population_Estimares/PopulationEstimatesbyLocality.pdf

[50] Governor's Aqaba Qasabah, 2019. Ministry of Interior Affairs, Aqaba Governorate, Jordan. Personal communication.

[51] NARC, Environment and Climate Change Research Directorate, 2020.

[52] PROFOR. Taking Action on Gender Gaps in Forest Landscapes: Working Paper, 2019. Available at: https://www.profor.info/sites/profor.info/files/Working%20Paper_Taking%20Action%20on%20Gender%20Gaps%20in%20Forest%20Landscapes.pdf

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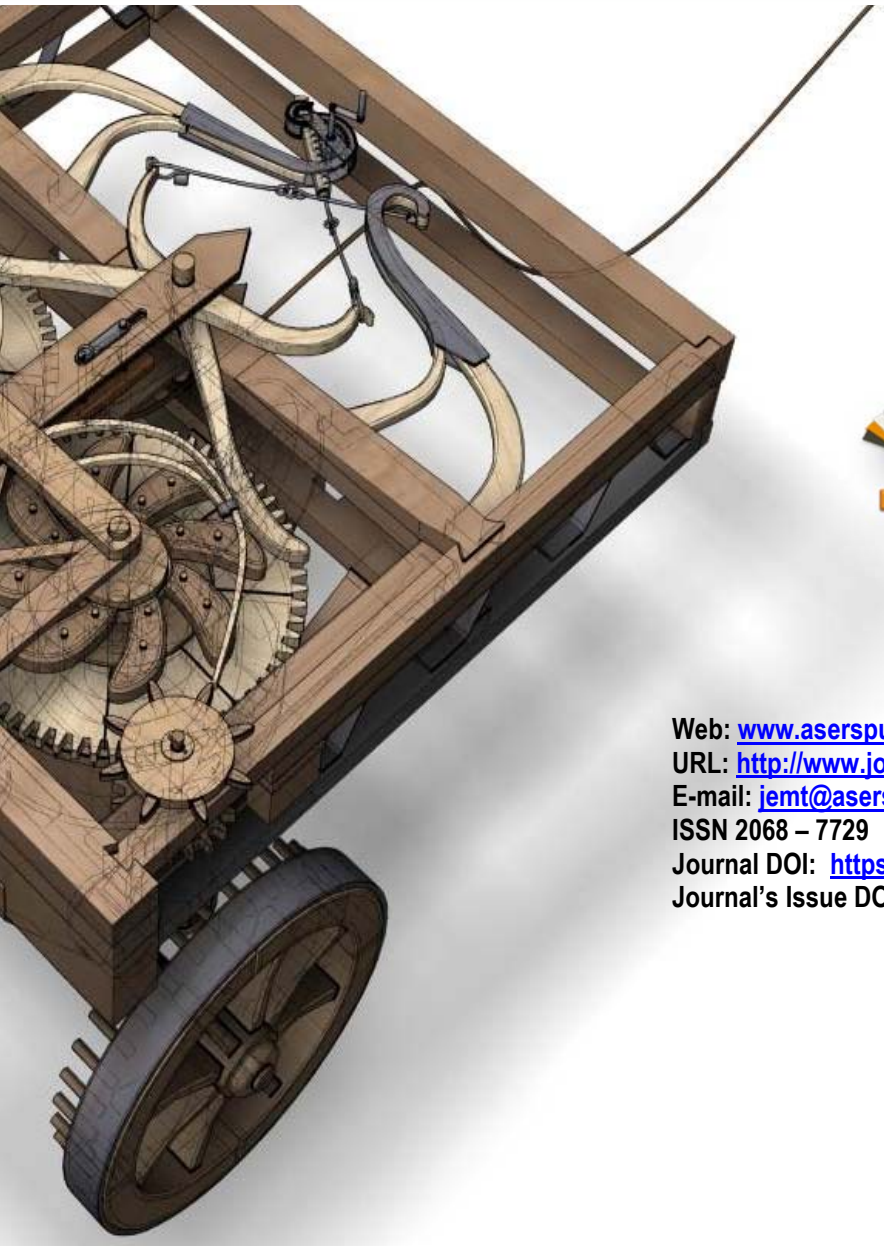

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