

Demographic Dynamics, Gender, and Resource Use in the Galapagos
Islands

Jason Bremner and Jaime Perez

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Contact Information: 86 Annandale Ave. Asheville, NC 28801, USA

Phone: 011-828-225-9836 Email: jason_Bremner@yahoo.com

Abstract

This paper reviews the most recent demographic information available from the Galapagos special census. The special census of Galapagos was carried out in November 1998 due to increasing concerns over the rapid growth of the population. The census also coincided with the implementation of the Special Law of the Galapagos, which was enacted by congress and created resident categories and migration laws. This special census information is compared to previous census data in order to reveal important trends and gender role changes. The remainder of the paper is dedicated to the review of several smaller scale surveys recently conducted by social scientists in the Galapagos. These surveys have in various degrees measured the attitudes, knowledge and practices of different subsets of men and women in the Galapagos. The analysis of existing data is used to make conclusions about gender changes in demographics and potential impacts on resources use patterns and conservation. The paper makes recommendations for mitigating these impacts and incorporating gender-based population-environment research into conservation planning.

Introduction:

Conservation groups have not traditionally incorporated demographic information into regional conservation planning. Migratory processes in particular have received little attention despite the important changes they cause in population growth rates, local economies, household structure, and gender roles. The rapid growth of the Galapagos Islands presents an outstanding example of the importance of understanding demographics and gender for long term conservation planning.

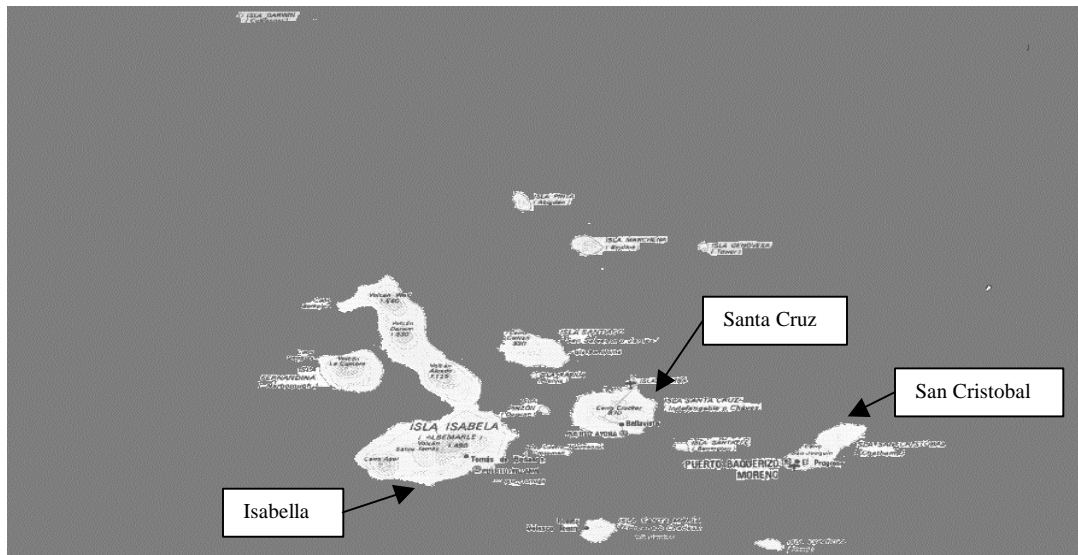
This paper reviews the most recent demographic information available from the special Galapagos census carried out in 1998. The census was carried out in response to concern over rapid population growth and migration to the islands. This information will be compared to previous census information in order to reveal important trends and gender role changes. The remainder of the paper is dedicated to the review of several smaller scale surveys recently conducted by social scientists in the Galapagos. These surveys have in various degrees measured the attitudes, knowledge and practices of different subsets of men and women in the Galapagos. The census and survey information will be used to make conclusions about gender changes and potential impacts on resource use and conservation. The paper makes recommendations for mitigating these impacts and incorporating gender-based population-environment research into conservation planning.

Background

The Galapagos Islands, located 1000 kilometers from the Ecuadorian coast, have been treasured as a unique place on this planet since Charles Darwin visited them in 1835. The archipelago is the natural habitat of a large number of endemic species and is

one of the most well preserved natural island system in the world. Recognizing this richness, the Ecuadorian Government created the Galapagos National Park in 1959 and the Galapagos Marine Reserve in 1986.

Figure 1. Map of the Galapagos National Park- Indicating the major populated centers.



Despite early visits by whalers and pirates, it was not until late in the 19th century that pioneers began to think of colonizing the Galapagos. Several first attempts failed, but early in the 20th century, small groups of colonists managed to permanently establish themselves on several islands (Latorre 1999). By 1959, when the Galapagos National Park was created, there were only 1000-2000 residents spread out on 4 of the 13 islands, and thus, the Ecuadorian Government decreed that 97.5% of the islands would be reserved as National Park and 2.5% set aside for human settlement. Since the early 1980's, however, the population has grown annually at a rate of approximately 6%, and the population of the islands now numbers over 15,000 (INEC 1998). Concurrent with the growth of the local population, tourist visits have increased dramatically. Over

60,000 tourists per year now visit the islands. The growing population has led to growing threats to the fragile ecosystem.

Although there are many conservation threats in the Galapagos, the principal conservation issues include: marine resources conflicts, over fishing of certain species such as sea cucumber, lobster, and shark for export to foreign markets, and the introduction of aggressive exotic species which displace and threaten native species (Sullivan Sealey and Bustamante 1999). Conservation organizations and the Ecuadorian Government have become increasingly concerned with how the growing population is aggravating these problems. In addition, the local population believes that human migration is now the most important problem in the islands (Fundación Natura 1999).

Demographic Dynamics in the Galapagos

The special census of Galapagos was carried out in November 1998 due to increasing concerns over the rapid growth of the population. The census also coincided with the implementation of the Special Law of the Galapagos, which was enacted by congress and created special laws for the islands, including: resident categories and migration laws. Before analyzing this information, two clarifications about the data must be made.

First, concerns have been raised about the validity of certain census results due to misconceptions among the general population concerning the census and residency status. Although it has not been confirmed, many people believe there was an influx of new arrivals just before the census, due to the misconception that one had to be present for the census to be considered for permanent residency. In addition, concerns have been raised about the response to a question of place of residence five years prior to the census. This question has been used to determine the number of new migrants since 1993. There may also have been misconceptions concerning this question and residency status, resulting in an under-reporting of what are referred to as “new migrants”. It is difficult to determine if these data issues affect gender analysis. One would have to determine if there was a gender bias in responses to these questions that would affect gender analysis. This potential bias has not been analyzed in this paper and likely will remain unknown until the next census.

The census recorded 16,083 people of whom 772 were determined to be tourists, thus leaving 15,311 inhabitants. In a review of gender and demographics Gavilán and Ospina made another important distinction; 650 inhabitants stated that their place of

usual residence was not the Galapagos. They found that these 650 people were predominantly male and by eliminating them from analysis, important conclusions about migration and gender could be made (2000). The inclusion of the non-permanent population masks important changes in gender and therefore, the review of census information in this paper will not include the tourist population or the non-permanent resident population for the 1998 data.

In the census of 1998, the total population of the Galapagos was recorded as 14,611 inhabitants, more than 2.3 times greater than the total population recorded in 1982 (Table 1). The annual growth rate has remained above five percent from 1982 to 1998, translating to a population doubling time of approximately 13 years¹. These growth rates are extremely high when compared with the national annual population growth rate of 2.1%.

Table 1. Total Population and Annual Growth Rates in Galapagos: 1982-1998

Year	Total population	Annual Growth Rate (percent)
1982 ^a	6119	-
1990 ^a	9785	6.0
1998 ^b	14661	5.1

Sources: INEC, National Censuses of 1982, 1990 and Galapagos Census 1998

a. Does not exclude tourists or non-permanent residents

b. Excludes tourists and non-permanent residents

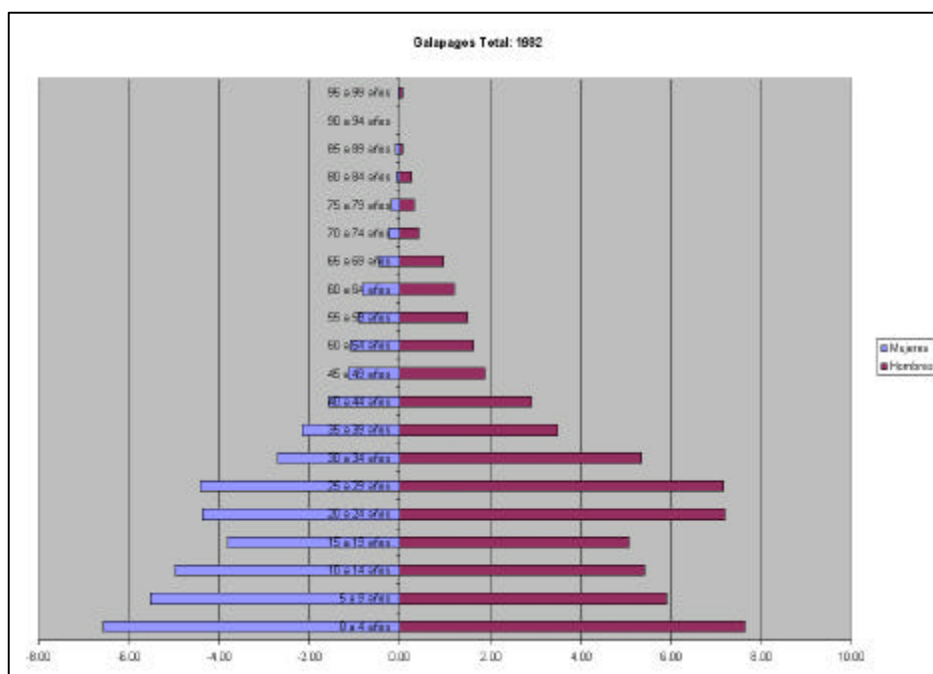
¹ Population Doubling time is calculated using logarithms. The rule of 70 can be applied; doubling time equals 70 divided by the annual population growth rate. In this case $70/5.1 = 13.7$ years.

In contrast to the high growth rates, the demographic and health or ENDEMAIN survey in 1998 shows that the total fertility rate (TFR)² of the Galapagos is 2.55 (CEPAR 2000). This rate is extremely low when compared to the TFR for Ecuador, 3.4, or urban levels, 2.8. In reality, the province of Galapagos has the lowest total fertility rate in the country.

By observing the extremely high growth rates and the low fertility rates, one must conclude that the growth of the Galapagos is primarily due to in-migration. The age-sex pyramids of the population in 1982, 1990, and 1998 (Figures 2,3,4) support this observation and show a concentration of the population in the working ages between 20 and 39. In addition, the pyramids are characterized by larger male populations, suggesting the migration of young males of working age. Through simple qualitative observation as well as census information one can conclude that the origin of the migrants is continental Ecuador. Although there are many foreigners in the islands, several restrictions deter foreigners from becoming permanent residents in Ecuador and the Galapagos.

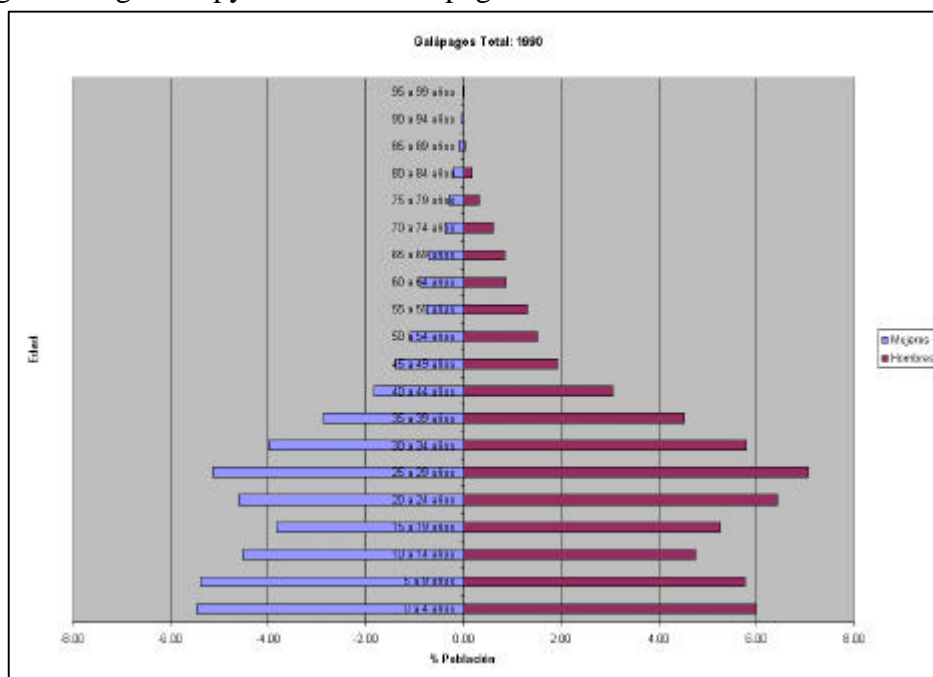
² Total fertility rate is a theoretical measurement used for fertility comparisons. It approximates the average number of children that would be born alive to a woman during her lifetime if she experiences a given set of age specific fertility rates (of a population in a given year). TFR can be calculated by adding the current age-specific fertility rates and multiplying by 5 if five-year age groups of women are used.

Figure 2. Age-Sex pyramids for Galapagos: 1982



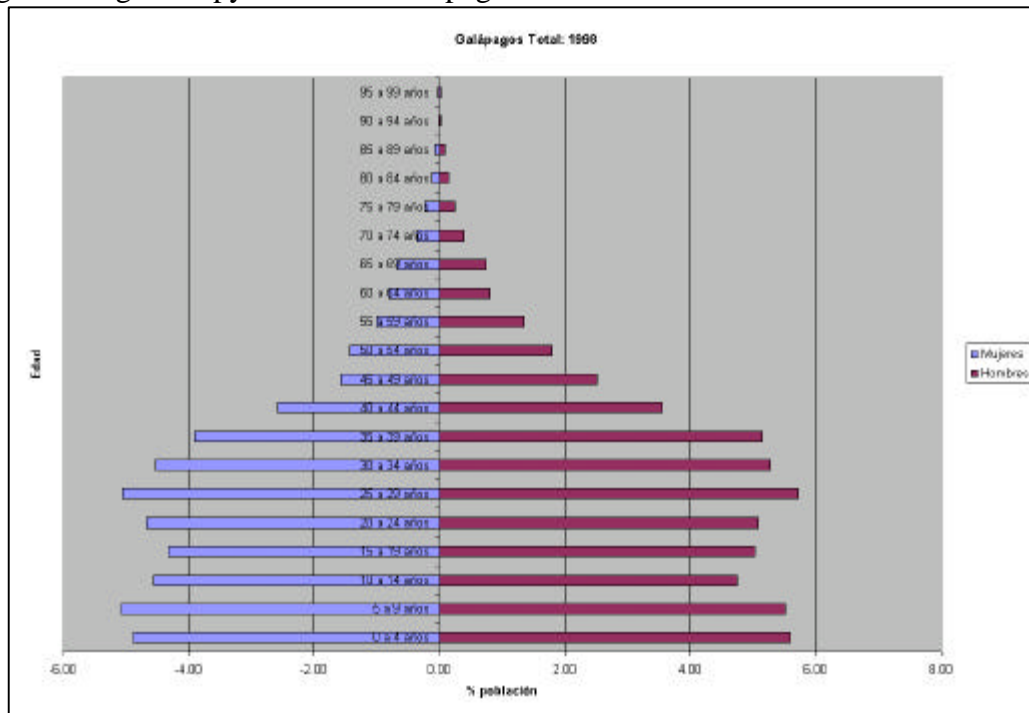
Source: INEC, National Census of 1982. Figure prepared by Carlos Larrea.

Figure 3. Age-Sex pyramids for Galapagos: 1990



Source: INEC, National Census of 1990. Figure prepared by Carlos Larrea.

Figure 4. Age-Sex pyramids for Galapagos: 1998.



Source: INEC, Galapagos Census of 1998. Figure prepared by Carlos Larrea.

Closer analysis of these age sex pyramids, as well as examination of trends in gender ratios, suggest that migration to the islands has begun to change. The pyramids in 1982 and 1990 have large concentrations of working age-males but by 1998 there has been a noticeable growth in the female side of the pyramid. The index of femininity calculated as number of females per 100 males has been steadily rising since 1974 and grew the fastest between 1990 and 1998 (Table 2). While the population in Galapagos remains characterized by a greater number of males, the trend since 1974 implies increasing femininity among the migrant population (Gavilán and Ospina, 2000).

Table 2. Femininity of the population of Galapagos in census years.

Year	Femininity (100*F/M)
1974	71.5
1982	72.4
1990	76.8
1998	83.9

Source: INEC, National Census of 1974, 1982, 1990 and Galapagos Census of 1998.

Gavilán and Ospina confirmed this trend by observing the gender ratio of the males and females in the recent migrant category (those people who responded that their residence five years before, in 1993, was not the Galapagos). They found that there were 1339 women and 1438 men or femininity of 93.1 (2000). This discovery is important because it implies that recent migration is no longer predominantly male but rather is more evenly split between males, 51.8%, and females 48.2%.

Why has migration to the Galapagos Islands changed?

Due to the harsh living conditions that the Galapagos Islands first presented, the original colonists were pioneers who were willing to risk an uncertain future. The economy was based upon small-scale fishing and agriculture and there were no public services such as electricity, sewers, and potable water. These conditions tended to attract primarily males (Latorre 1999). By the late 70's and early 80's, both the tourism industry and the lobster fishery had started to boom, and the islands began to develop an attractive economy. Before long, rapid upgrades to the islands' amenities were made. More frequent flights to the continent were established. Schools were improved. Restaurants and hotels for tourists demanded the improvement of electrical, sewer, and

phone service. Today, the island's three small urban centers belie the hardships that faced migrants just 30-40 years ago.

The rapid growth of the Galapagos economy and the improvement of services have resulted in two important changes that have increasingly attracted female migrants. First, male migrants became established and either brought their already existing families or started new families in the islands. Data from the 1998 census shows that the majority, 73.2%, of female migrants who arrived before 1993, said their motive for arriving in the Galapagos was family related (Table 3).

Table 3. Past migrants' motive for migrating to the Galapagos by sex. (Percent)

	Men	Women
For Work	54.1	24.9
Looking for work	2.6	1.9
Family Motive	43.3	73.2
Don't Know	--	--
Total	100	100

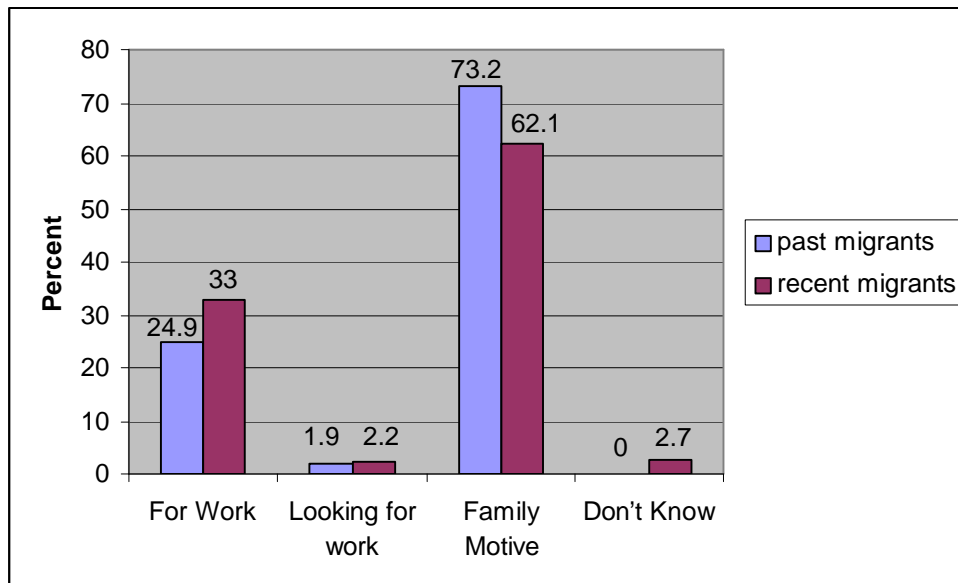
Source: Galapagos census 1998, 3449 men and 2858 women

This conclusion is confirmed by Gavilán and Ospina who showed that between 1990 and 1998, both the number and proportion of males and females who were in a stable partnership (defined as either married or living together) increased (2000). This increase in the number of established families has important implications for long-term conservation that will be discussed in greater detail later in the paper.

The second important change that is attracting female migrants is the changing structure of the Galapagos economy. The growth of the local economy has resulted in many new offices, restaurants, and other small businesses, thus creating many new administrative and clerical positions. In addition, the number of children has grown and

there is a greater need for teachers. These growing sectors of the economy have expanded the work opportunities for female migrants who were traditionally left out of the primary economy of boat-based tourism, agriculture, and fishing. Figure 5 compares past and recent female migrants' motives for moving to the Galapagos, and shows that a significantly greater number of recent female migrants, 33.0 %, than past female migrants, 24.9% reported that their motive for migrating to the Galapagos was for work (chi square=31.2, $p<0.0000001$).

Figure 5. Past and recent female migrants' motive for migrating to the Galapagos.



Source: Galapagos census 1998, recent migrants >5 years of age 1427 women, past migrants >5 years 2858 women.

Analysis of the indicators that illustrate the Economically Active Population (PEA) and Economically Inactive Population (PEI) provide additional support to the theory of increasing female involvement in the labor force. Gavilán and Ospina (2000) analyzed these indicators for the general population, and Borja, Perez, and Bremner (2000) analyzed the recent migrant population. Both studies showed that there were large

differences between male and female involvement in the economically active population (chi square=817.27, $p<0.0000001$; chi square=255.89, $p<0.0000001$) (Tables 4 and 5).

Figure 6 shows the statistically significant differences between the PEA of the general female population, 32.7%, and the female recent migrant population, 42.1% and shows that women are becoming increasingly involved in the Galapagos work force (chi square=44.72, $p<0.0000001$). It should be noted, however, that this difference could be confounded by age differences between the total population and the recent migrant population, thus future analysis should make a similar comparison controlling for age.

Table 4. PEA and PEI in Galapagos by sex.

	Male		Female	
	Number	Percent	Number	Percent
PEA	5088	69.9	1974	32.7
PEI	2037	28	3948	65.4
Undeclared	152	2.1	115	1.9
Total	7277	100%	6037	100%

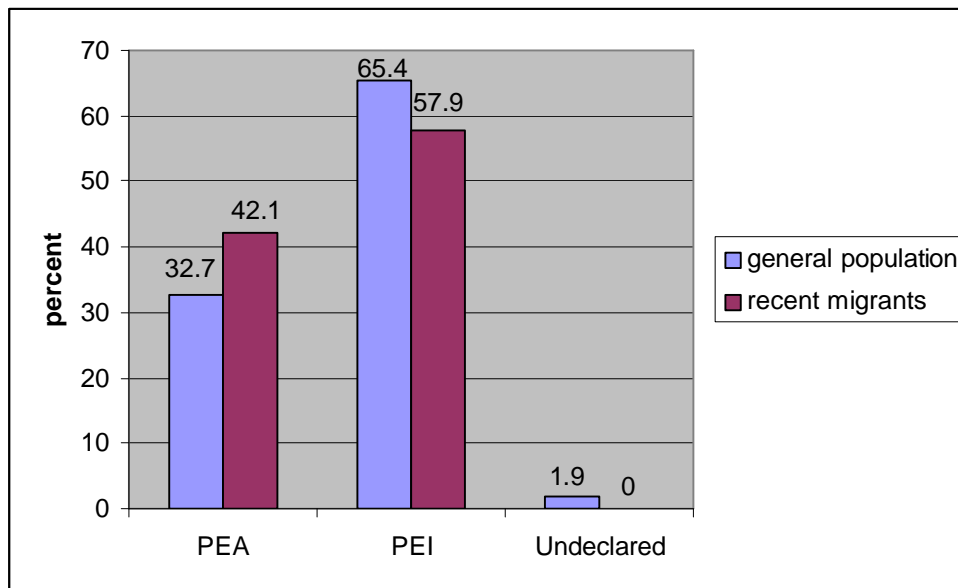
Source: Census 1998, population >6. Cited in Gavilán and Ospina (2000)

Table 5. PEA and PEI of the recent migrant population by sex.

Source: Census 1998, recent migrant pop. >6. Cited in Borja et al. 2000

	Male		Female	
	Number	Percent	Number	Percent
PEA	1396	78.8	589	42.1
PEI	375	21.2	809	57.9
Undeclared	--	--	--	--
Total	1771	100%	1398	100%

Figure 6. PEA and PEI of women amongst the general population and recent migrants.



A final important piece of information shows proportional changes in the structure of the PEA between 1982 and 1998. The traditionally male activities of agriculture, fishing, and construction have shown little or no increase in their proportion of the PEA. At the same time, commerce and hotels and restaurants grew in their overall proportion of the PEA, thus potentially presenting more opportunities for female employment and female migrants.

What does increasing female migration to the Galapagos signify for natural resource use and conservation strategies?

There are two principal mechanisms through which the growing female population in the Galapagos could potentially affect natural resource use patterns. First, if women have different knowledge, attitudes, and practices with respect to natural resource use, their growing population and growing involvement in the workforce could have potential

impacts on current use patterns. Second, as more women arrive in the Galapagos and the number of permanent unions increases, settled households may have an impact on the environment. These impacts may manifest as either the intensification of current resource use patterns due to increased family size, or conversely as increased environmental awareness as concern for the family's well being increases.

Three small surveys allow for a comparison of male and female knowledge, attitudes, and practices with respect to natural resource use and conservation. The annual public opinion survey conducted in the Galapagos Islands by Fundación Natura illustrates beliefs and attitudes towards conservation threats, perceived threats, and conservation organizations. When faced with the question of the most important conservation problem in the Galapagos, both men and women ranked controlling migration as the greatest priority (Borja et al. 2000) (Table 6). Comparison of these priorities by sex revealed no statistically significant differences.

Table 6. Priority problem identified by sex (Percent)

Priority	Total Population	Men	Women
Controlling Migration	33.2	30.6	35.8
Control introduced species	24.2	24.8	23.6
Regulate the use of natural resources	18.9	19.1	18.7
Protect the flora	14.0	14.4	13.6
Protect the fauna	9.2	10.5	8.0
All are a priority	0.4	0.5	0.3

Source: Public Opinion survey Fundación Natura (1999) N=582

In a separate question that asked about levels of agreement with varying statements related to conservation and problems in the Galapagos, males and females responded nearly identically (Borja et al. 2000). No important distinctions that would impact conservation efforts could be identified. The survey, therefore, does not provide concrete

evidence that there is a difference in attitudes or beliefs regarding natural resource use and conservation.

In a separate survey conducted by Perez, gender roles and their relationship to the environment were analyzed on each island (2000). On all three islands, activities that were the responsibility of women included: cooking, cleaning, laundry, taking care of the children, taking care of a sick or elderly family member, helping children with homework, shopping, and taking care of plants. It is believed that this last responsibility is in reference to small plants around the home and perhaps a small garden. Male household responsibilities seemed to include mostly repairs as well as some shared responsibility for shopping and child caring. Most women declared that men's primary responsibility was related to their job or profession.

On all three islands, greater than 50 percent of women surveyed had some type of productive activity that generated income (71, 70, and 52 percent in Santa Cruz, Isabela, and San Cristobal respectively). The three primary activities listed by these women and confirmed by census data were commerce, public administration, and tourism. Due to the fact that more than 80% of the population of Galapagos lives in urban areas, very few women reported any responsibilities having to do with agriculture (Table 7).

Table 7. Population Distribution in Urban and Rural Areas of Galapagos by Percentage

Santa Cruz	San Cristobal	Isabela	Galapagos
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Urban	84.4	87.7	89.7	86.0
Rural	15.6	12.3	10.3	14.0
Total	100	100	100	100

Source: INEC, Galapagos Census 1998

Perez also attempted to determine if women's involvement in different community groups might affect resource use patterns. The three islands showed varying levels of community organization and female participation. The smallest island, Isabela, had the least amount of community organization as well as the least amount of female involvement, whereas the larger islands of San Cristobal and Santa Cruz offered more opportunities for women's involvement in community organization.

With respect to natural resource use, however, some of the most important groups, the fishing cooperatives, seem to offer little opportunity for female participation. In a separate investigation, Ramirez conducted focus groups with the wives of fishermen on the three islands (2000). Women stated that they had neither a voice nor a vote at cooperative meetings despite their interest in participating. Others stated that the cooperatives were poorly organized and that their husbands only went when they had to pay their quotas. Ramirez found that the majority of women stated that they don't work directly in fishing. The women who do participate only assist with commercialization or help with logistics and permits.

In order to examine women's knowledge regarding conservation, Perez asked a series of questions that included: identifying the roles of the Galapagos National Park Service and the Charles Darwin Research Station, and identifying native and introduced species (2000). In all three islands, women had a relatively good knowledge of the role of these organizations, although levels of agreement with these organizations tended to

vary. It is also important to note that women were found to have a very good knowledge of introduced species and their associated problems, probably due to an aggressive public education program being implemented by the SICGAL, the quarantine and control organization. Women's knowledge of this threat as well as their high levels of education (Borja et al 2000) are promising for conservation.

The lack of women's involvement in fishing, limited involvement in agriculture, similar knowledge and beliefs as men, and high education levels seem to weaken the first theory; that if women have different knowledge, attitudes, and practices with respect to natural resource use, their growing population could have potential impacts on current use patterns. This appears to be especially true with respect to the conservation threats of marine conflicts and over fishing. Therefore, the next step is to explore the second possibility discussed earlier: as more women arrive in the Galapagos and the number of permanent unions increases, settled households may have an impact on the environment.

Earlier in the paper it was stated that there has been an increase in the proportion of men and women involved in stable unions. This increase in partnerships could have several potential impacts on long-term conservation in the islands. First, an increase in stable couples residing in the Galapagos represents a greater future growth potential for the Galapagos population. Research has shown that fertility is related to union stability and that more stable unions exhibit greater fertility (Glaser 1999; Trovato and Taylor 1980; Nobbe et al. 1976; Chen et al. 1974). Conversely, however, recent migrants have higher education levels than past migrants and natives, and increased education has repeatedly been shown to decrease fertility. Nonetheless, the 1998 age-sex pyramid shows a large young population, which in spite of fertility rates represents considerable

population momentum. Even if future migration were reduced to zero and fertility dropped substantially, the population will continue to grow. The growing population will create an increasing demand for imports, will intensify current resource use, will put pressure on the limited space available to the population, and will necessitate economic growth and the development of new economic opportunities. These changes will aggravate all of the current conservation threats and likely create new threats.

Despite the increasing femininity, the gender ratio is still heavily skewed (83.9). This suggests that there are still a large number of young men without a potential mate and consequently a continuing future need for female migration. This need will combine with the population growth described above and result in greater long-term growth of the population.

Curiously, in spite of the rapid growth of the population and concerns about migration, focus groups conducted by Borja, Perez, and Bremner found that many economic sectors reported a shortage of qualified labor and a need to contract workers from the mainland. Current migration laws allow for renewable one-year labor contracts to fulfill these needs. If migration laws, however, are not enforced, or if officials prove to be corruptible, there will be the potential for new male and female migrants to fill these shortages. If current trends continue, more males than females will arrive to fill available positions and later female migrants will arrive to adjust for the gender imbalance.

Conclusions and Recommendations

The histories of the colonization of the Galapagos and several decades of predominantly male migration have resulted in a population with a male weighted gender ratio. Within the past two decades, however, women have constituted a growing proportion of the migrant population. The majority of women are arriving for family reasons, probably marriage, but a growing number of women are arriving to work in expanding sectors of the economy.

The majority of the population of the Galapagos is urban and women have little direct involvement in traditional resource use such as agriculture, animal husbandry, or fishing. This suggests that with respect to the conservation threats of marine resource conflicts and over fishing, women do not have direct impacts. Deeper questions however remain unanswered. Are there aspects of the marine conflict that will be exacerbated or abated by the increased presence of women and more stable households? Will fishing of already depleted species intensify as men feel increased economic pressure to provide for their families that are now settled in the Galapagos? Answers to these questions will require supplemental qualitative information to fill in the gaps between census information and biological catch information.

With regards to the threat of introduced species, the impact of the growing female population is unclear. Information from gender-based surveys showed little evidence of different resource use patterns or attitudes towards conservation amongst women.

Women, however, are becoming more involved in commerce, public administration, and tourism, all of which are related to the import of goods from the continent. Although it was stated earlier that the SICGAL program has helped to educate people about

introduced species, there is no research that shows that families have altered their consumption patterns to prevent new introductions. Future gender research related to introduced species must answer questions such as: What consumption patterns are leading to the introduction of exotic species; Who controls or influences these consumption patterns at different levels (i.e. commerce, household, tourism); and are education programs resulting in improvements in consumption patterns?

The greatest impact of the increasing femininity of the Galapagos population may not be due to direct impacts caused by women, but rather due to an increase in the growth potential for the population. A larger population will undoubtedly result in the long-term aggravation of existing conservation threats as well as the creation of new threats. There are already signs of new fisheries (shark fins) that will take the place of the dwindling profits available from lobster and sea cucumber fishing. Increasing waste disposal problems and energy needs for the growing population also have the potential to cause new conflicts. Information from the next census will allow demographers to make population projections that could help to determine the future energy and waste disposal needs of the population in order to avoid these conflicts. In addition, the population will eventually face spatial limitations and will likely have to encroach on national park lands as the population expands.

In order to avoid future conservation threats, short-term emphasis should be placed on reducing the skew in femininity while at the same time decreasing the growth potential for the population. Satisfying labor needs by training local and migrant women would be an excellent first step towards reducing the gender skew. Increasing the availability of reproductive health services in the islands would be a positive action as

well. A local clinic would improve the lives of women who currently have to fly to the continent for services and would help to further reduce already low fertility rates. To ensure long-term preservation of the Galapagos Islands, future research will have to anticipate the emerging threats related to a growing population, and social scientists, natural scientists and local authorities will have to work together to develop conservation strategies.

Incorporating Gender-Based Population-Environment Research into Conservation Planning

The rapid growth of the Galapagos Islands presents an outstanding example of the importance of understanding demographics and gender for long term conservation planning. It is, however, a very unique situation and should not be generalized to other areas. Gender aspects of demographics, nonetheless, should be considered for every conservation site.

At the least, conservation planners should have a clear notion of gender ratios, migration patterns (both in-migration and out-migration), and the impacts of these demographic factors on gender roles and resource use. Without such information, community conservation workers and conservation planners face several risks that include: working with the wrong stakeholders, the out-migration of male or female stakeholders, or unperceived changes in resource use patterns that affect the conservation target. For example, similar work carried out in the coastal Machalilla National Park found great amounts of seasonal temporal migration which resulted in changing gender

roles amongst the small agricultural communities in and surrounding the park. These seasonal changes had not initially been addressed in community conservation projects.

The information used to determine gender ratios, migration patterns, and gender roles does not require complicated methodology, census information, or quantitative survey techniques. Although in most settings, census information is available, migration patterns can change rapidly and are not always captured by census information. In addition, census information is often outdated and does not focus on natural resource use. Participatory and Rapid Rural Appraisal techniques, which are often used in participatory conservation planning, are simple and accessible tools that can be used for collecting this information.

A well-trained team with the correct package of qualitative tools can rapidly collect all the necessary information in several communities. In Ecuador, Denise Caudill and the author recently tested a set of tools that allowed for rapid base-line analysis of six-highland communities of 150-250 families in ten days (Caudill 2001). This information will be used for the planning of an integrated population-environment program as well as future monitoring and evaluation.

There are a few requirements for implementing a similar set of tools in conservation areas. These tools are not meant to be used solely once but should be implemented regularly. Therefore it is recommended that conservation organizations or conservation partners have a social scientist on staff in order to train staff, supervise collection, and analyze information. Quite often partners contract out base line or evaluation work, which results in losses in information and lost opportunities for new skill integration.

In addition, conservation organizations and other efforts such as the MERGE project³ need to continue to with their strong effort to promote the inclusion of gender in conservation planning and projects. These efforts have made an important contribution to understanding gender roles and resource use and will have a strong impact on future conservation efforts.

³ For information on the Merge Program see www.latam.ufl.edu/merge/

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