

**FOOTPRINTS ON PUERTO VALLARTA:  
SOCIAL SPACES AND ENVIRONMENTAL IMPACTS**

**Working Paper #2005-12**

**November 2005**

## **Rural Development Institute, Brandon University**

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**Rural Development Institute  
Brandon University  
Brandon, Manitoba, R7A 6A9  
Canada**

Researched and Prepared by:

John Everitt (Brandon University)

Edmundo Andrade Romo

María del Carmen Cortés Lara

Rodrigo Espinoza Sanchez

Rafael García de Quevedo-Machain

Alma R. Raymundo-Huizar

(Universidad de Guadalajara, Centro Universitario de la Costa, campus Puerto Vallarta.)

Bryan H. Massam (York University)

Rosa M. Chávez-Dagostino

Amilcar Cupul-Magaña

Luis Fernando González-Guevara

María del Carmen Navarro Rodríguez

Laura Gabriela Hernández Cahou

Roberto Hernández Cahou

Jorge Ricardo Chávez Arce

Carlos Munguía Fregoso

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# Table of Contents

1.0 Preface.....	1
2.0 Social footprints on Puerto Vallarta.....	2
3.0 Ecological footprint of Puerto Vallarta.....	13
3.1 Introduction.....	13
3.2 Quality of life.....	15
3.3 Sustainable development and the ecological footprint .....	17
3.4 Case study in Puerto Vallarta.....	20
4.0 Concluding remarks and future projects.....	41
5.0 Appendices.....	42
6.0 References.....	59
6.1 References in Print.....	59
6.2 Website References.....	61

## 1.0 Preface

This is the third report to be published by the Rural Development Institute (RDI) at Brandon University, Manitoba, Canada that presents the results of collaborative research undertaken by members of a joint research team from the Universidad de Guadalajara Centro Universitario de la Costa, campus Puerto Vallarta and the RDI. Dr. Bryan H. Massam from the Department of Geography at York University, Toronto, Canada has been a member of the team since the beginning of the project in 2000 and other colleagues from Puerto Vallarta have provided valuable assistance. They include Laura Gabriela Hernández Cahou, Roberto Hernández Cahou, Jorge Ricardo Chávez Arce, and Carlos Munguía Fregoso. The joint research and teaching project has been undertaken under the aegis of a formal agreement between Brandon University and the U of G. The initial period of the agreement began in 2000 and extended to 2005. A new agreement is in place to extend the project until 2007.

The first report was:

Massam, B.H. and Everitt, J. et al. (2003) Quality of Life in the Puerto Vallarta Region of Jalisco State, Mexico, Working Paper #2003-01 Rural Development Institute, Brandon University, Manitoba, Canada

The second report was:

Everitt, J. Massam, B.H. et al. (2004) Perceptions of Spaces in Puerto Vallarta, Jalisco, Mexico, Working Paper #2004-1 Rural Development Institute, Brandon University, Manitoba, Canada

Both reports are available from the web site of the Rural Development Institute, Brandon University: <http://www.brandonu.ca/organizations/RDI/publications3.html>

The research presented in this report will extend the previous work on the impacts of tourism in Puerto Vallarta and the land use patterns in the growing city as this place changes to accommodate increasing numbers of visitors, and seeks to deal with issues of quality of life and sustainability. Previous reports have offered an overview of the growth of tourism in Puerto Vallarta and comments and empirical data on quality of life and sustainability that must be addressed as policy makers, citizens and the business community deal with the emerging trends of population growth and the carrying capacity of the infrastructure, especially the roads and water plants.

The first section of the present report will review concepts concerning a series of “social footprints” on Puerto Vallarta as manifest by various developments in the cultural landscape that have largely resulted from tourism. The second section will deal specifically with the concept of the “ecological footprint” with its emphasis on the environmental effects of a growing population with the individual demands and needs of specific groups in this population. Empirical data will be presented as part of each section as well as comments on the conceptual bases of the analysis. The final section will identify possible projects to extend the collaborative work over the next few years.

John Everitt Ph.D.  
*Christoph Stadel Professor of Geography*  
Department of Geography  
Brandon University  
November, 2005

## 2.0 Social footprints on Puerto Vallarta

Tourism has many impacts upon a cultural landscape such as that of the Puerto Vallarta region of Jalisco State, Mexico (Figure One). Sometimes these impacts are “obvious” and

**Figure 1: An overview of Puerto Vallarta.**



sometimes more subtle. Sometimes they are “obvious” to the local population, but are taken at face value by the non-locals, in the case of Puerto Vallarta (PV), the tourists (of various kinds), the “snowbirds”, and the “expats”. These impacts change, of course, over time and over space, and what we are reporting on here is a “snapshot” of the impacts upon PV. It is hoped that the Puerto Vallarta “tourist space” can be compared to tourist spaces developed and discussed elsewhere (such as Cancun, [see Torres and Momsen, 2005]), and that this document can thus contribute to the growing literature on tourist impact in the contemporary world. Although the word “impact” is most often taken to have a negative connotation, impacts by tourists, snowbirds and expats upon a cultural landscape are often seen as beneficial by both local and non-locals. For this reason we are using the term “footprint” as an attempt to introduce some value-neutral terminology.

Footprints can take a variety of forms, but in this section we will be concentrating upon some that are of relevance to the social geography of the Puerto Vallarta region. Social geography studies how society affects geographical features and how environmental factors affect society ([http://en.wikipedia.org/wiki/Social\\_geography](http://en.wikipedia.org/wiki/Social_geography) ). Questions in the field of social geography are many and varied and our selection is by no means an attempt to document all of the possible footprints, but rather to select a number of important characteristics that illustrate some of the variety of changes that have occurred in Puerto Vallarta in recent years.

Our data sources for this research were many, and varied depending upon the particular footprint that we wanted to illustrate. For some there is published data, although the quality of these data is variable. For some it involved fieldwork, good old-fashioned, “geography through the soles of our boots”. For some it involved interviews with key informants, and for some it involved questionnaires aimed at various sectors of the Vallartan population – both local and non-local. The data have been collected, in some instances, over the past several years, and should not be seen as a reflection of the PV cultural landscape at any particular point in time.

Six social footprints will be presented in this report. The first footprint represents the generalized social areas of Puerto Vallarta, which involved the delineation of relatively uniform sub areas of the PV region. These social areas were identified by field research (principally observation of the cultural landscape over a period of years), by the use of mental mapping techniques with a variety of local informants, and by interviews with key informants. They remain, however, to some extent subjective and qualitative in nature. Fourteen kinds of region were delineated, and these are mapped in Figure Two. It should be noted, however, that these social areas are not meant to be precisely located, but rather indicate parts of the urban area that are more or less distinctive. Although we are generally confident of these results, further research into the social areas of PV will be warranted in the future, as data improve, and as the areas grow and change in nature. As discussed elsewhere, the present status of these areas, and their future growth has been and is likely to continue to be heavily influenced by the physical environment of the PV urban region (Everitt et al. 2001).

The social areas include parts of the city which mostly contain “locals” and other areas that most commonly contain foreigners, as well as some that include affluent non-local Mexicans (such as parts of Marina Vallarta [#1 on Figure Two], and Conchas Chinas [#4]) and others that are more mixed (#13). The locals’ areas range from very high status (such as #14 on Figure Two) to a number of squatter settlements. Some, like a number of the peripheral squatter settlements (#12), are fairly clearly demarcated in the “real world”. Others, and particularly those in the contiguous urban area, are separated sometimes separated from neighbouring areas by transition zones (for

instance #6 and #15 on Figure Two), and sometimes by transportation lines (for instance #6 and #11).

The foreigners range less in economic terms (from modest to very wealthy), but quite widely in terms of landscape and activity preferences, from what Plog (1977) has termed allocentric to psychocentric. Psychocentrics can be seen as anxious, inhibited and less adventurous, and in terms of “places” were seen by Plog to be represented by Coney Island (at the extreme) and Miami Beach. In the Vallartan context the Northern Hotel Zone (#13 on Figure Two) would be the most characteristic area of this type. Allocentrics are more inquisitive travelers and are thus more adventurous, outgoing and seek out new experiences. Plog saw these as travelers to Africa or the South Pacific, and there are no direct correlates in our case study. In the Vallartan situation we would thus see these as the tourists who most commonly live in the South Hotel Zone and the older area of town directly inland from this (areas #3 and #4 on Figure Two).

Figures Three to Eight are a series of maps of other social footprints on the PV area. Although these only represent a selection of the possible impresses of tourists upon the region, and in many ways represent ‘works in progress’, they do indicate some of the most characteristic actions and behaviour patterns involving tourists, snowbirds, and expats – and sometimes locals.

Figure Three indicates the locations of hotels in the older parts of the city. Although these range in size and type, most are relatively small and are characterized by travelers who are located towards the allocentric side of Plog’s model. With two exceptions they are located south of the Cuale River in the ‘Zona Romantica’.

Figure Four shows the other hotels, found to the north and the south of the core areas, and which are relatively larger (often “all inclusive”) and more likely to include psychocentric tourists.

Figure Five maps the restaurants in the central areas of town. Although many restaurants are found within hotels, particularly in the hotel zone, the “Romantic Zone” and the “Old Town” also contain a variety of eating establishments that cater particularly to the non-local population. The eating-places are varied, both small and large, and ranging from “five star” to “no star”. There are, of course, many “Mexican” food restaurants, but also others catering to a variety of tastes from “French” to “McDonald’s”. Some locational generalisations can be made about this footprint. The “popular food” restaurants of Anglo American origin (e.g. “No Name Café”) are mostly close to Downtown. The higher priced restaurants are usually farther from the seashore and farther uphill. The romantic zone is more mixed, but usually the cheaper restaurants and those catering to the “local” (or mixed local and tourist) population are farther inland.

Figure Six indicates the location of Art Galleries, a distinctive landscape and social phenomenon begun in many instances by expats, and supported largely by wealthy non-locals (both North American and Mexican).

Figure Seven shows Internet Cafés: this phenomenon is quite new, but is also a ‘shifting’ one in that these businesses move and fail quite often – to be replaced in the same locations, or elsewhere, by similar operations. Internet Cafés are supported by both locals and non-locals, and represent one of the few kinds of business where this is clearly the case.

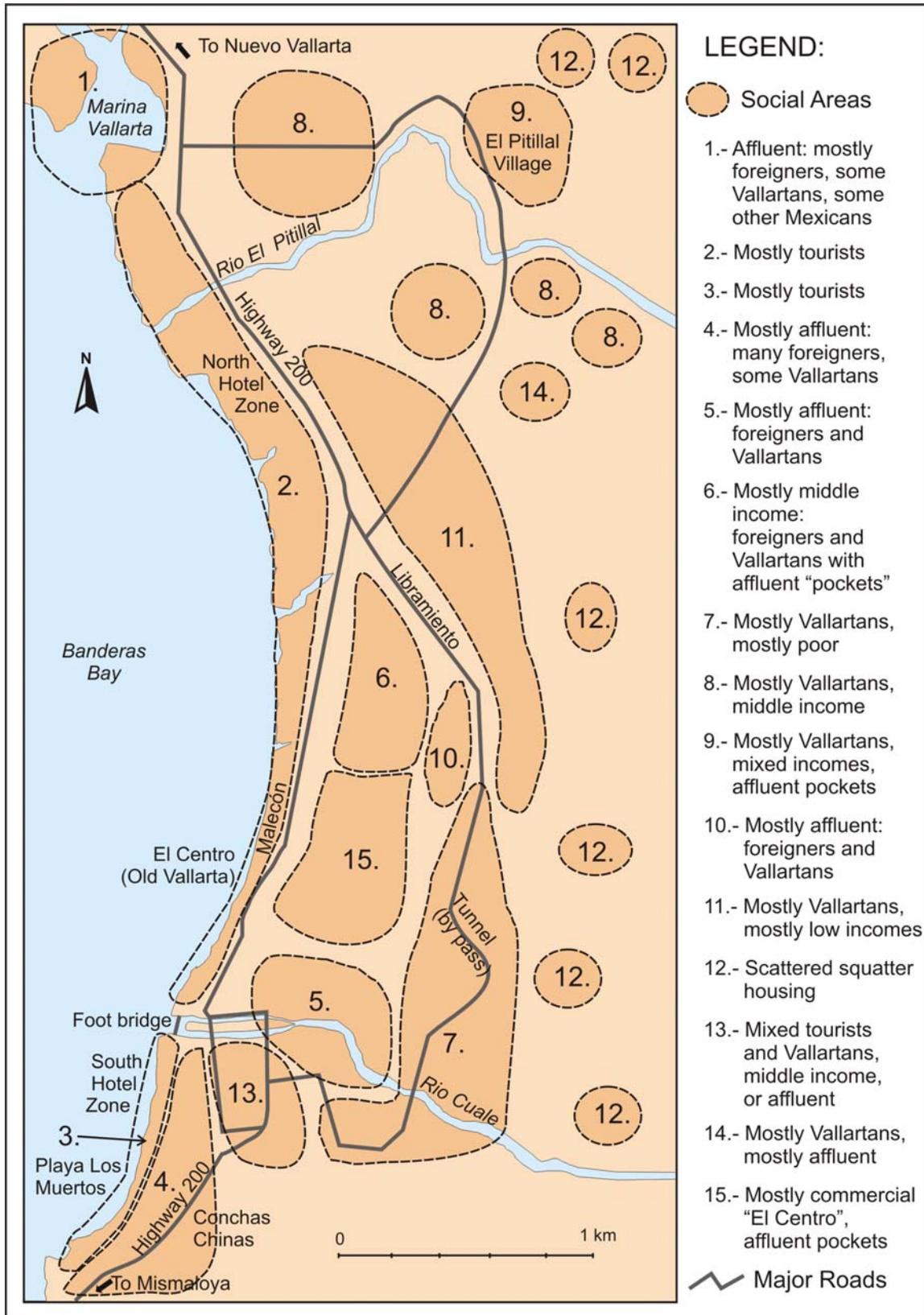
Figure Eight maps businesses that serve the gay market in Puerto Vallarta. In recent years Vallarta has developed a large gay community footprint, which has concentrated in the “Zona Romantica”. Businesses owned by, or catering to, this gay population also concentrate in these older areas of the city. These businesses also serve non-gays, although in some cases people who are not members of the gay community are not encouraged.

These footprints of private space begin to give us a window on the variable impacts of tourism within the Vallarta region. There are influences everywhere, but most of the footprints so far investigated are more evident in Central (“Old”) Vallarta, to both the north and the south of the Cuale River. That is to say, within a limited number of the social spaces mapped in Figure One. The making of these footprints has, however, in turn impacted pre-existing activities, often pushing them (and their own footprints) further out into the region surrounding the city of Puerto Vallarta (Everitt et al. 2001; Massam and Everitt, 2001; Massam, Everitt et al. 2003). The place characteristics of these peripheral spaces remain to be investigated.

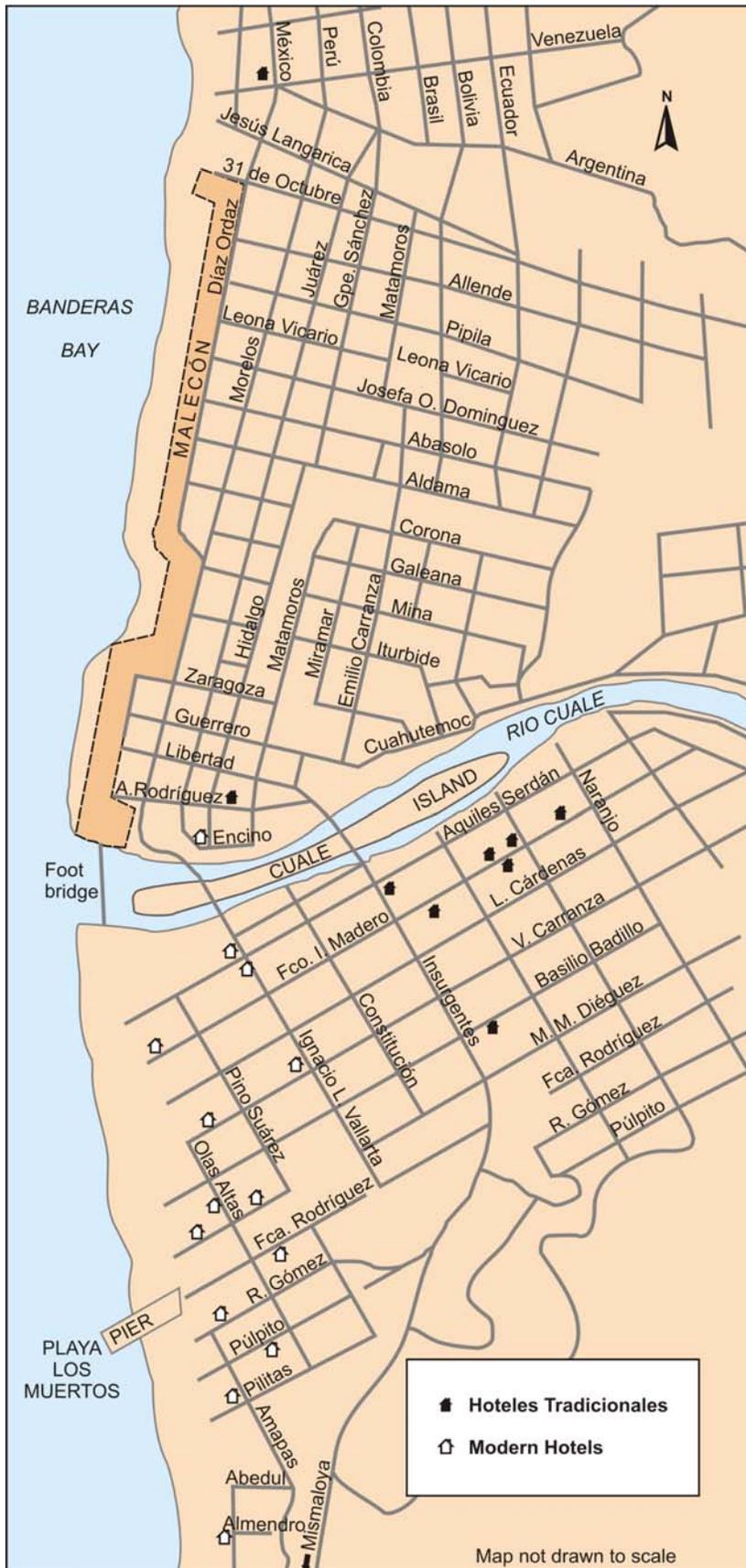
The footprints within the older areas are made in an uneven (and far from random) manner, with different sub-spaces being created. Thus different kinds of restaurant, different kinds of hotel, and different social groups create their own distinctive places. The place content of these tourist spaces may overlap (an internet café or an art gallery serving a gay population), but at the same time each place retains a distinctiveness that can be seen and appreciated by locals, tourists and researchers alike. This is also true of some other places (plazas) previously studied in PV (Everitt, Massam et al., 2004; Massam and Everitt, 2004). Comparisons between these areas and other similar places such as Cozumel and the tourist-oriented settlements around Lake Chapala might prove fruitful (Everitt and Welsted, 1999)

The footprints in the newer areas such as the North Hotel Zone, Marina Vallarta, and Nuevo Vallarta are quite different, and in some ways less variable, and thus perhaps less interesting to some, but they are at least as important to the tourist landscapes of the region. They are also ones where comparison might be made with similar areas elsewhere in Mexico, such as Cancun (Torres and Momsen, 2004)

**Figure 2: Social Areas in Puerto Vallarta**



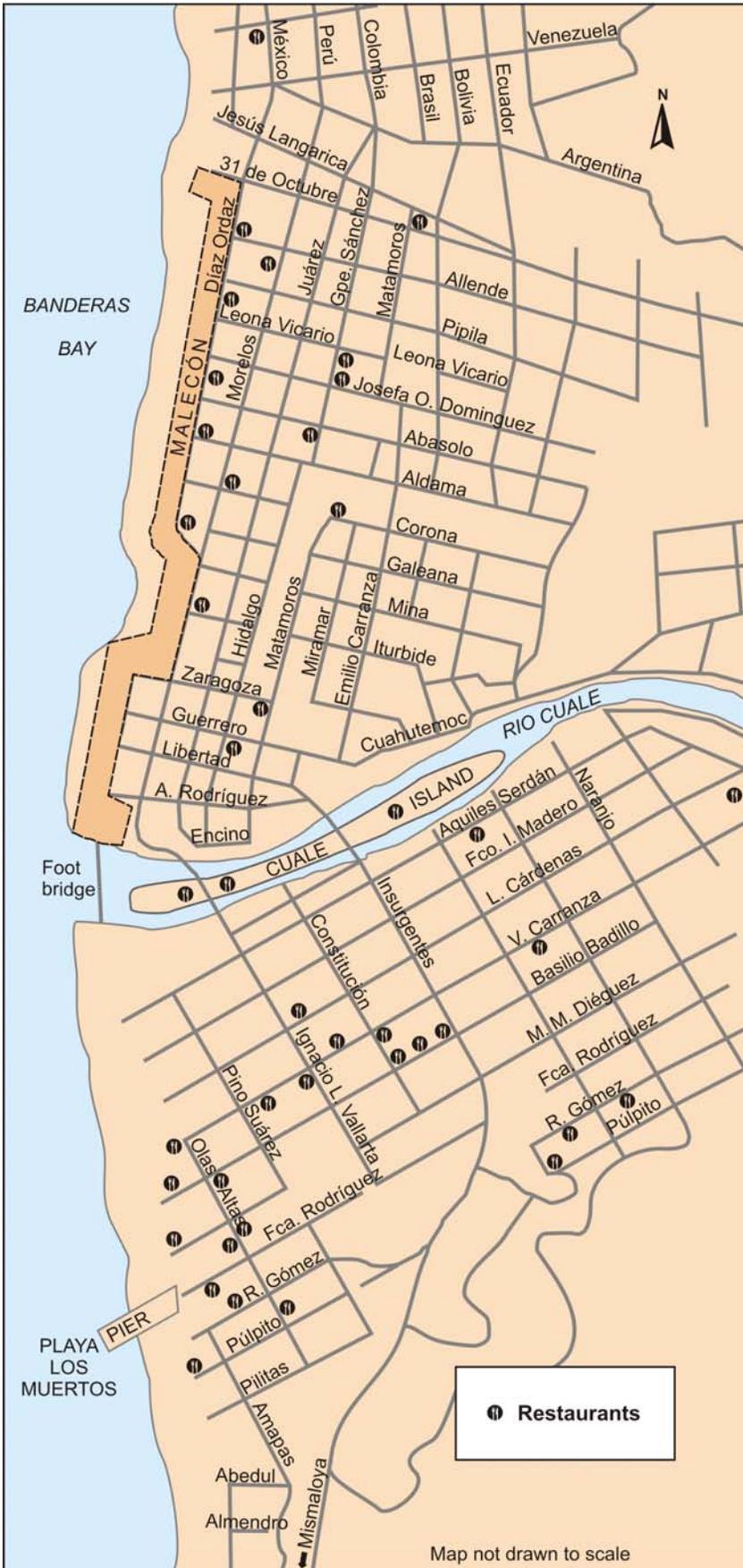
**Figure 3: Hotels in Central Puerto Vallarta**



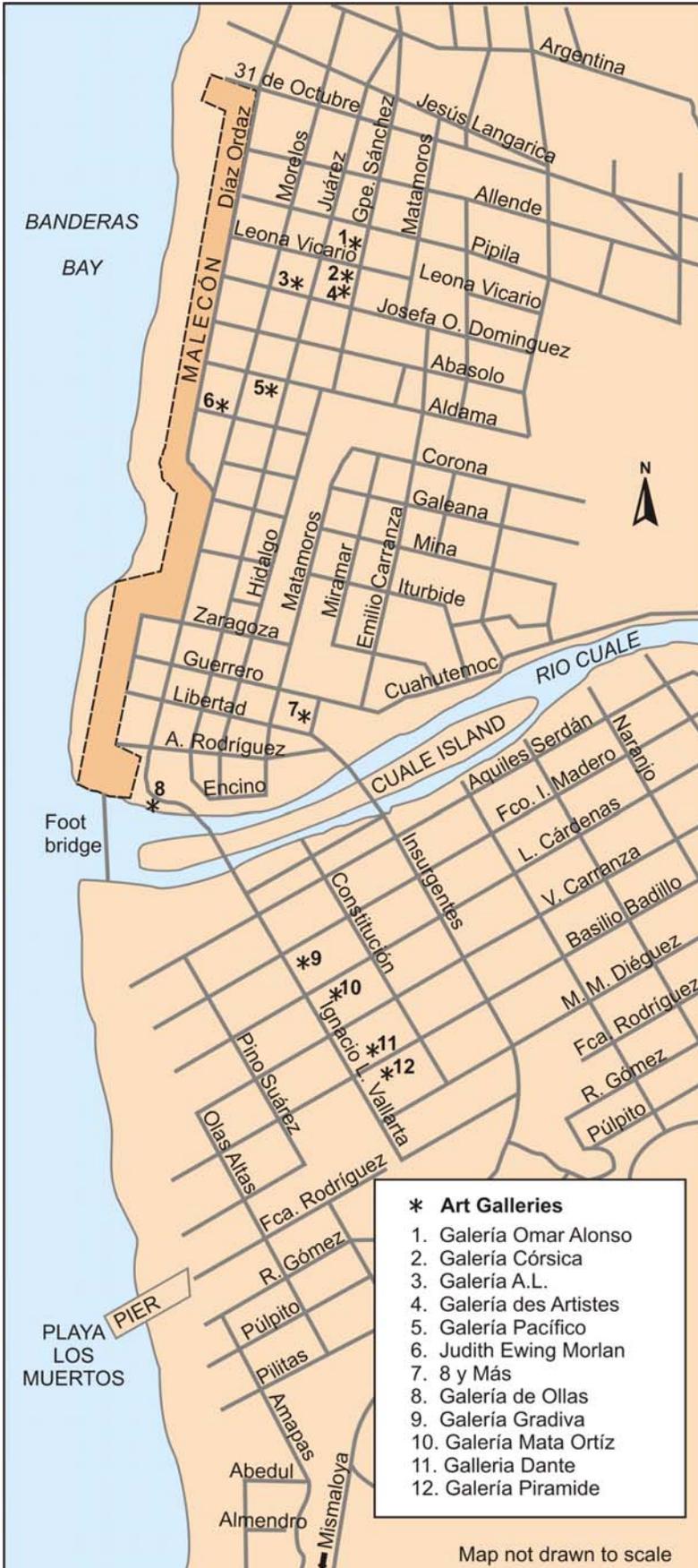
**Figure 4: Other Vallartan Hotels**



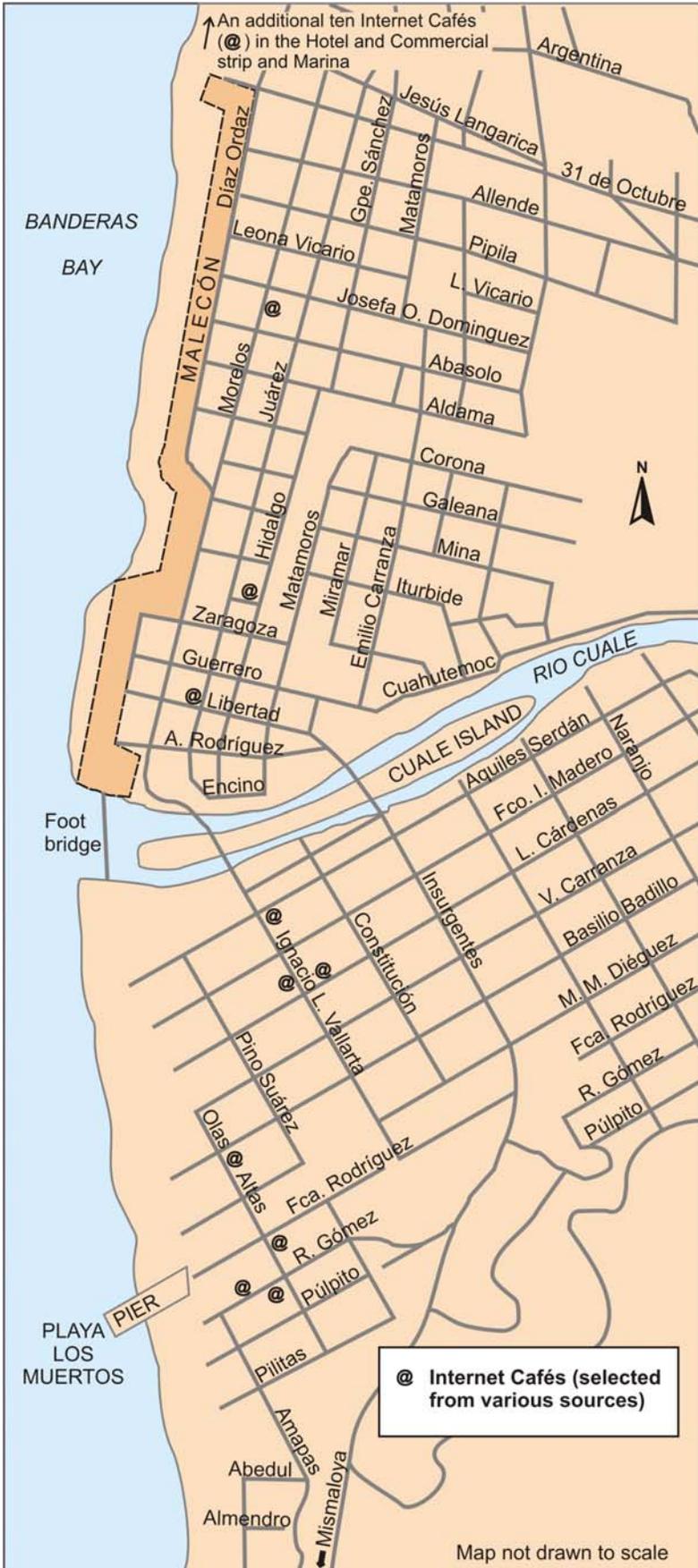
**Figure 5: Restaurants in Central Puerto Vallarta**



**Figure 6: Art Galleries in Central Puerto Vallarta**



**Figure 7: Internet Cafés in Central Puerto Vallarta**





## 3.0 Ecological footprint of Puerto Vallarta

### 3.1 Introduction

In earlier times, especially prior to the Enlightenment, it was commonly held that the future rested to a large extent on the efforts of individuals and groups to propitiate the gods. Successful presentation of offerings, monuments, sacrifices and the like resulted in continued life for the suppliants. Failure to provide to the deity the appropriate recognition of their mighty power could result in catastrophe. In modern times we resort to human agency to protect the future, and as our world is finite we need to pay attention to concepts of sustainability and appropriate social and individual behaviour to ensure our species will continue. We cannot rely on a deity to protect and project us into the future no matter how splendid the monument or cultural facility we build to try to appease their appetite. The future of a place such as Puerto Vallarta depends on the actions of individuals and organizations to protect the environment, and to avoid waste and improve the quality of life for all there: both residents and tourists, now and in the future. Changes to the built environment, the natural habitat and land use patterns, as well as population growth and the growth in consumption will put more and more strain on the carrying capacity of Puerto Vallarta and the state of Jalisco. The search is for the means to promote a sustainable community. Some are inclined to regard sustainability as technical matter while others following the lead of Hardin (1968) in his classic paper on *The Tragedy of the Commons* clearly and convincingly argue that wise use of resources requires more than technical solution and this class of problem can be thought of, as he indicates in his paper as a ‘non-technical solution’ problem. The cultural values of the society play a major role in resource usage and sustainability. In an age of increasing consumerism there is a price to be paid.

Wright (2004, 32) recently reminded us in his Massey Lectures given across Canada in November 2004 on *A Short History of Human Progress* that culture, as defined in a technical and anthropological way: ‘... mean[s] the whole of any society’s knowledge, beliefs and practices. Culture is everything from veganism to cannibalism; Beethoven to Botticelli, and body piercing ...and all of technology from the split stone to the split atom.’ He concludes his lectures by arguing that:

“We have the tools and the means to share resources, clean up pollution, dispense basic health care and birth control and set economic limits in line with natural ones. If we don’t do these things now, while we prosper, we will never be able to do them when times get hard. ...Now is our last chance to get the future right.” (Wright 2004, 132)

Unless societies come to terms with material consumption and exploitation of depleting resources our world is not sustainable and our so-called civilizations will disappear: cities will face civil unrest and the prospect of violence and chaos if issues of sustainability are not successfully addressed.

In March 2005 the Millennium Ecosystem Assessment report was released and it clearly demonstrates the effects of continued exploitation of resources coupled with growing consumption of non-renewable sources of energy and changing social, political and economic patterns are having massive adverse effects on the earth’s capacity to sustain growing numbers of people. The consequences are dire. Details of this report are available on the web site: [www.millenniumassessment.org/](http://www.millenniumassessment.org/).

Political leaders at all levels, especially of the major countries of the world, and national agencies and international organizations have key roles to play. Civic conversations are vital to ensure that citizens are informed and aware of their actions on fellow human beings in their regions and in other regions, both in the short run and the future. The difficulties of persuading all to co-operate and share resources wisely in an unselfish way are monstrously difficult. But surely a key starting point is to undertake a realistic, reliable and scientifically valid survey of the current situation, and from this suggest consequences of continues patterns of consumption. Ultimately such an approach may yield trust and conscious efforts to move toward wiser consumption patterns. We wonder if such a report as the one mentioned above will have the desired effects to change significantly the patterns of consumption, production and distribution so that a sustainable global population can be supported at a decent level of quality of life by the earth's carrying capacity. Only time will tell.

The Federation of Canadian Municipalities (FCM) has offered a definition of a sustainable community as '...a smart community. It achieves economic, environmental and social health by:

- Making the most efficient use of resources
- Generating the least amount of waste
- Providing high quality of services to residents
- Living within the carrying capacity of its natural resources (land, water, air)

Sustainable communities preserve or improve quality of life while minimizing impact on the environment.' To promote the sustainability of Canadian municipalities the FCM has established the Centre for Sustainable Community Development (CSCD), which administers the Green Municipal Funds (GMF) programme. This programme provides funding and expertise to assist communities develop sustainable plans and projects. 'To date the \$250-million federal endowment has funded 300 studies and 50 projects in Canada involving energy, water, transportation, waste and sustainable community planning in communities of all sizes in all regions of Canada.

The Sustainable Research Institute at the University of British Columbia (UBC) provides a succinct definition of the term *sustainable development* that reflect the broadly held views that '...sustainable development requires an integration of the **ecological imperative** to stay within the carrying capacity of the planet, the **economic imperative** to provide an adequate standard of living for all, and the **social imperative** to develop forms of government that promote the values people want to live by.' The process of reconciling these imperatives test the wit of citizens, public and private agencies and states. Dale and Robinson (1996) note '...the imperatives are causally interdependent. It is not possible to change the direction or nature of one without also paying attention to the other two. Given the interconnectedness, failure by any one, will make it impossible to address the other two.' Massam and Dickinson (1999) have argued that perhaps the civic state, working within the context of a global system of such states, may provide the best hope for finding a system that will function practically to seek reconciliation of the three imperatives. Massam (2000), in his book on the civic state, elaborates this view and it is one that places responsibility on citizens to take responsibility and not be dictated to by technocrats, bureaucrats or worst of all, politicians. This places a heavy burden on individuals to actively engage in civil conversations and take responsible actions in their individual patterns of consumption.

## 3.2 Quality of life

The study of QOL occupies the attention of many theoreticians and practitioners who are concerned about sustainability and urban living. The search for appropriate definitions of this somewhat nebulous term continues, and attempts have been made to provide clear operational definitions so that the effects of specific policies that influence the QOL of places and people can be evaluated. A comprehensive review of the topic of QOL is provided by Massam (2002). In this section we will focus first on identifying some basic theoretical issues. Second, we will provide a brief review of a specific index of QOL that has been developed by a team of researchers in Toronto. This index uses concepts of *being*, *belonging* and *becoming*. Finally, we will offer an overview of the *Genuine Progress Index*, which attempts to deal specifically with the notion of sustainability of a place that specifically looks at the concept of the ecological footprint. We believe this concept deserves to be examined closely as it appears to have merit for use in a city's planning and policy making, as well as in the civic conversation among citizens about the future.

The difficulty in trying to define QOL stems from the fact that it can mean different things to different people, in a tangible or physical sense QOL is influenced by ones income, genes, community and place of birth, but the pursuit of the 'good life' can also be spiritual or philosophical. The philosopher Kingwell (2000, 207) in his book: *The World We Want: Virtue, Vice and the Good Citizen*, examines the concept of QOL and he reminds us of the unstable relationship that many thoughtful people encounter between success and meaning. They want to know what it all means, what their personal prosperity is in aid of: fulfillment, virtue, happiness, something. They want a telos of some kind, in other words, an end in view that helps make life worth living. Ultimately, it is argued that the search for the good life can be construed as the good life.

As the individual perception of QOL has been seen to differ widely it is useful to collect information from individuals concerning their perceptions of their QOL. Renwick and Brown (1996) have developed a questionnaire that asks individuals to indicate the importance and satisfaction levels for a set of indicators relating to QOL. They have suggested a set of nine indicators for three basic dimensions, which relate to the QOL of an individual. The dimensions are shown below. Details of this approach are provided on the web site ( [www.utoronto.ca/qol](http://www.utoronto.ca/qol) )

### **Being:**

Physical: my body and health,  
Psychological: my thoughts and feelings,  
Spiritual: my beliefs and values.

### **Belonging:**

Physical: where I live and spend my time,  
Social, the people around me,  
Community: my access to community resources.

### **Becoming:**

Practical: the daily things I do,  
Leisure: the things I do for fun and enjoyment,  
Growth: the things I do to cope and change.

Examining sustainability at the individual, regional or national scale can be problematic because of varying classifications and overlapping data. To conceptualize the sustainability of individual consumption or that of a nation or area more effectively two models can be used; the *Ecological Footprint* and the *Genuine Progress Index* (GPI).

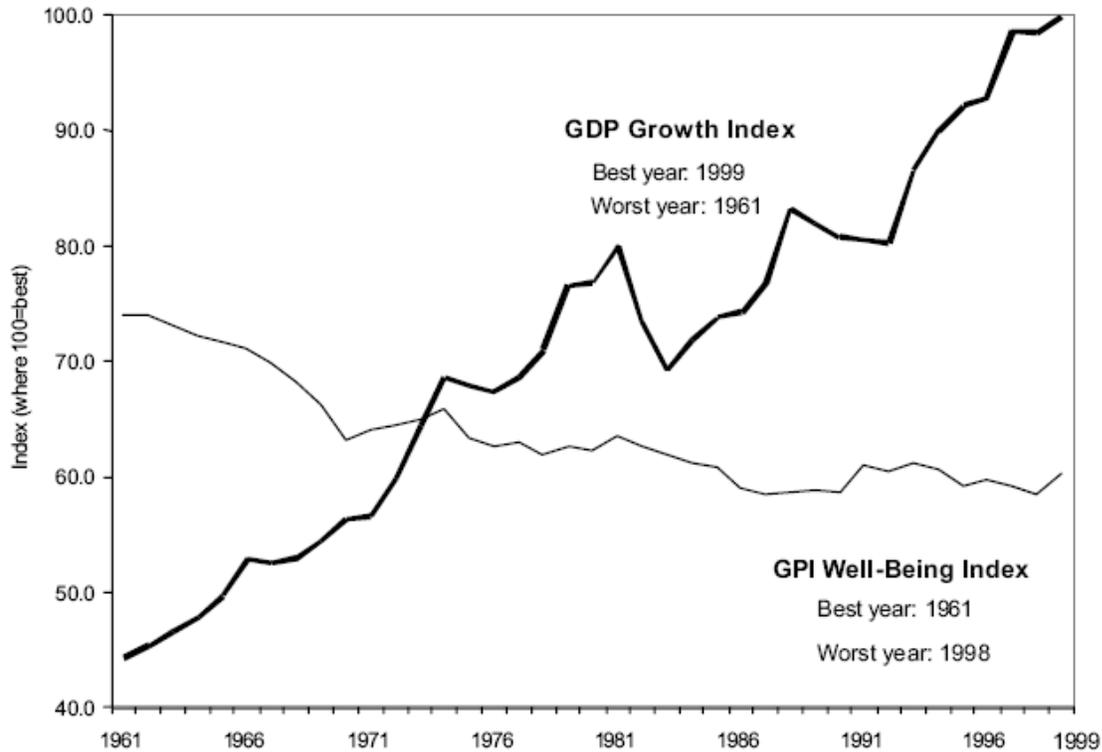
According to the City of Toronto website [www.city.toronto.on.ca/eia/footprint](http://www.city.toronto.on.ca/eia/footprint), ‘the ecological footprint is an ecological accounting tool that can measure the environmental impact of human activities. The ecological footprint is the area of biologically productive land and water area needed to supply the resources and assimilate the wastes generated by that population, using the prevailing technology.’

Using the ecological footprint tool can help to educate individuals by visually representing the environmental impacts of individual consumption patterns. According to the creators of the pilot survey project in Toronto, when people use the survey and learn the results it motivates them to reduce their own consumption and promotes awareness about sustainable practices.

The *Genuine Progress Index* (GPI) was developed to show that rising GDP levels do not necessarily indicate rising standards of living and QOL. The GPI as outlined by Worts (2004) calculates the GDP for a province or country and then systematically adjusts it to reflect the real costs that have traditionally not been included. These real costs include economic factors, personal or societal factors and environmental factors. Worts (2004) provides a compelling illustration of this discrepancy by using the Canadian province of Alberta as an example.

“Although Alberta's GDP growth has been strong over the decades, the GPI for Alberta (and the rest of the country for that matter), reveals serious long-term damage to the environment, as well as the creation of an increasing number of social and economic problems. The graph on Figure Nine, which compares Alberta's GDP and GPI, illustrates the discrepancy between financial growth and the slow erosion of general well being. It is a trend that would likely be revealed if similar comparative assessments were conducted in other provinces across the country.”

**Figure 9: The Alberta GPI Well-being Index versus Alberta GDP Index, 1961 to 1999**



Source: Alberta GPI Accounts 1961-1999

Both of these tools (GDP and GPI) are designed to educate people about the challenges of sustainability. They also illustrate the fact that increased consumption and rising levels of regional or national wealth do not automatically mean greater levels of QOL.

### **3.3 Sustainable development and the ecological footprint**

Critical and groundbreaking work on sustainability has been undertaken at UBC in the Centre for Community and Regional Planning under the leadership of Dr William Rees. He has worked assiduously for a number of years to develop with colleagues, especially Mathis Wackernagel, the concept of the ecological footprint as related to carrying capacity. A detailed review of this concept will not be given in this paper as information about the concept of ecological footprint is readily available from many texts and web sites, for example, Wackernagel and Rees (1996) and Chambers, Simmons and Wackernagel (2002). They argue that it is necessary to move beyond rhetoric concerning the carrying capacity of a place and to try to provide some measurable indication of the consumption of resources used by activities of humans in a specific place. A search using [www.google.ca](http://www.google.ca) for the words *ecological footprint* yields over 282,000 hits and the related term *carrying capacity* generates over 4,860,00 hits. Perhaps one of the most important hits is the paper by Rees which is given on <http://dieoff.org/page110.htm> and another fine contribution is on [www.ecouncil.ac.cr/rio/focus/report/english/footprint/](http://www.ecouncil.ac.cr/rio/focus/report/english/footprint/).

Current information about the variety of ecological footprint analyses is available from the electronic list that can be reached via the e-mail address for the Global Footprint Network news list at ([info@footprintnetwork.org](mailto:info@footprintnetwork.org)).

“Ecological footprint analysis is an accounting tool that enables us to estimate the resource consumption and waste assimilation requirements of defined human population or economy in terms of a corresponding productive land area. Typical questions we can ask with this tool include: how dependent is our study population on resource imports from ‘elsewhere’ and on the waste assimilation capacity of the global commons? And will nature’s productivity be adequate to satisfy the rising material expectations of growing human populations into the next century?” Wackernagel and Rees (1996, 9)

Other concepts such as The Genuine Progress Index ([www.rprogress.org](http://www.rprogress.org)) and the Natural Step approach ([www.naturalstep.ca/](http://www.naturalstep.ca/)) closely relate to the ecological footprint concepts. These concepts concern quality of life and a review of literature on this large topic is given in the monograph by Massam (2003).

A questionnaire tool that allows us to calculate the consumption that relates to specific types of human activity has been developed. The web site that was used to calculate the ecological footprint for this project is: [www.earthday.net/footprint/index.asp](http://www.earthday.net/footprint/index.asp). This site is also accessible from [www.myfootprint.org](http://www.myfootprint.org). (Appendix 1). For example, if a person always walks, and lives in a small dwelling that relies on a renewable energy supply, and does not eat a lot of imported packaged foods, they use fewer resources and thus has a small ecological footprint. At the other extreme is the person who often drives a large vehicle, and lives in a massive house with air-conditioning running for many hours each day, using electricity produced by an oil-fired generator and often eats food that is processed, packaged and transported long distances. Such a person may also travel long distances by plane each year, and drives a vehicle without any passengers that has high-energy consumption. This type of consumer will need large ecological footprint to sustain them.

The ecological footprint quiz is structured around a set of 16 questions that relate to four basic categories of human activities each of which contributes to demand for land. The four basic categories are:

Food (shown as F on the Tables of results)

Mobility (shown as M on the Tables of results)

Shelter (shown as S on the Tables of results)

Good and services (shown as G/S on the Tables of results)

The questions for each category are shown on the quiz in Appendix 1. It should be noted that the categories of choices for some questions vary from country to country while the basic set of questions remain the same. Commentary regarding the validity of the 16 questions and the four categories in the quiz is provided in Appendix 2. The quiz results comprise several pieces of information and a typical output is shown as Figure Ten. For the particular individual who completed this quiz the total ecological footprint is 3.9 hectares. The pattern of food consumption requires 0.8 hectares, while mobility, shelter and good & services require 0.6, 0.6 and 1.9 hectares respectively. The average ecological footprint in the country of the respondent is 2.5 hectares; hence the respondent has a slightly lower ecological footprint than the average. However, at the global scale the footprint of the respondent is 2.1 hectares greater than the global average of 1.8 hectares. If the world comprised such people with the average consumption pattern of 2.2 hectares then the earth could not sustain them all. It would require 2.2 planets of the size of earth to sustain humans with this consumption pattern

**Figure 10: Sample Results for Ecological Quiz**

**quiz results**

CATEGORY	GLOBAL HECTARES
FOOD	0.8
MOBILITY	0.6
SHELTER	0.6
GOODS/SERVICES	1.9
TOTAL FOOTPRINT	3.9

IN COMPARISON, THE AVERAGE ECOLOGICAL FOOTPRINT IN YOUR COUNTRY IS  
2.5 GLOBAL HECTARES PER PERSON.

WORLDWIDE, THERE EXIST 1.8 BIOLOGICALLY PRODUCTIVE GLOBAL HECTARES  
PER PERSON.

IF EVERYONE LIVED LIKE YOU, WE WOULD NEED 2.2 PLANETS.



### 3.4 Case study in Puerto Vallarta

In February 2005 several samples of groups of individuals were defined by the team members after focus group discussions regarding the selection of representative members of specific communities in Puerto Vallarta. It was decided to include locals of various age groups, as well as specifically poor people and ‘snowbirds’ who spend the winters in Puerto Vallarta typically from the USA or Canada. We also wanted to collect opinions from some teachers who for the most part are expatriates to Puerto Vallarta, and environmental planners now working in the city. The list of the samples is given on Table 1. The research team selected 13 samples of individuals to interview. Initially it was hoped to obtain 15 responses for each sample. However, this proved not to be possible but the interviews did generate 160 complete questionnaires.

For each questionnaire we calculated the ecological footprint results as mentioned above and the results for the 13 sets of data have been collated to generate 13 summary tables of results. They are shown as Tables 2-14. Also we have calculated summaries of the total set of data and these are shown on Tables 15 and 16.

**Table 1: Samples: Interviewed in February 2005**

	<b>Female</b>	<b>Total</b>	<b>Male</b>
1 Snowbirds: non Mexican visitors to P.V.	3	7	4
2 Snowbirds: non-Mexican visitors to P.V.	2	11	9
3 Snowbirds: non-Mexican visitors to P.V.	4	4	0
4 Mexican visitors to P.V.	6	15	9
5 Seniors in P.V. (65+)	11	16	5
6 Middle age group in P.V. (36-50)	7	15	8
7 Poor in P.V. all ages	8	15	7
8 Poor in P.V. all ages	12	15	3
9 P.V. residents: random sample	9	15	6
10 Younger group in P.V. (21-35)	10	15	5
11 Younger group in P.V. (21-35)	6	15	9
12 Teachers in P.V. in a private school mainly expatriates	6	8	2
13 Environmental planners and ecologists working in P.V.	6	9	3
<b>TOTAL</b>	<b>90</b>	<b>160</b>	<b>70</b>

**Table 2: Summary Tables**

<b>Sample 1</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	4.2	8.6	14.8	22.7	49	10.6
<b>Female: max</b>	2.1	1.6	4.6	6.4	14.1	7.8
<b>Male: min</b>	2.4	1.5	2.4	4	10.7	5.9
<b>Female: min</b>	0.4	0.7	2.2	3	6.3	3.5
<b>Male: average</b>	3.4	5.8	8.2	13.7	31.3	9.4
<b>Female: average</b>	1.3	1.1	3.4	4.3	8.1	5.7
<b>Overall Average</b>	2.5	3.8	6.1	9.7	22.2	7.8

**Notes:**

5 Canadians, their average ΣEF is 8.8 and #P is 6.6  
2 Americans, their average ΣEF is 24 and #P is 10.8  
Males consistently have a higher EF than females

**Key for Tables 2-16**

F: food, hectares of land  
M: mobility, hectares of land  
S: shelter, hectares of land  
G/S: good and services, hectares of land  
EF: total ecological footprint, hectares of land  
#P: number of planets, each the size of earth

**Table 3: Summary Tables**

<b>Sample 2</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	6.9	9.6	8.6	16.5	17.1	9.5
<b>Female: max</b>	4.2	6.7	3.2	8.9	13.7	7.6
<b>Male: min</b>	0.6	1.4	1	2.9	9.4	3.3
<b>Female: min</b>	2.1	5.2	0.5	5.9	2.3	5.2
<b>Male: average</b>	2.4	4.2	3.8	8.5	16.3	9.9
<b>Female: average</b>	3.1	5.9	1.8	7.4	8	6.4
<b>Overall Average</b>	2.5	4.5	3.5	8.3	16.7	6.5

**Notes:**

Typically a large living space is occupied by couples and high levels of consumption in all four categories yield very high ΣEF values and # Planet scores.

**Table 4: Summary Tables**

<b>Sample 3</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	0	0	0	0	0	0
<b>Female: max</b>	3.7	3.7	7.7	10.4	12.9	7.2
<b>Male: min</b>	0	0	0	0	0	0
<b>Female: min</b>	0.8	0.6	2.9	4.2	2.6	4.7
<b>Male: average</b>	0	0	0	0	0	0
<b>Female: average</b>	1.9	1.7	4.1	6.4	8.5	5.8
<b>Overall Average</b>	1.9	1.7	4.1	6.4	8.5	5.8

**Notes:**

A very small sample of only 4 females: 3 others were approached and made the general comment "we do not believe in this kind of work on ecological footprint and sustainability and our consumption patterns: what we do is of no concern to others."

**Table 5: Summary Tables**

<b>Sample 4</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1.2	6.4	1.2	11	18.8	10.4
<b>Female: max</b>	1.2	1.6	0.6	3.5	6.9	3.8
<b>Male: min</b>	0.8	0	0.4	0.3	2.1	1.2
<b>Female: min</b>	0.6	0	0.2	0.5	1.6	1
<b>Male: average</b>	0.9	1.2	0.6	2.7	5.9	3.3
<b>Female: average</b>	0.9	0.4	0.4	1.2	3	1.7
<b>Overall Average</b>	0.9	0.9	0.5	2.1	4.7	2.6

**Notes:**

1 young male (aged 21) .... # Planets 10.4 distorts overall results, living in a 3-person household with a large home space and heavy use of automobile and reliance on many goods and services.

**Table 6: Summary Tables**

<b>Sample 5</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1.4	0.6	1.3	2.9	5.7	3.2
<b>Female: max</b>	1.3	1.7	0.9	2.6	6	3.3
<b>Male: min</b>	0.7	0	0.5	0.6	2	1.1
<b>Female: min</b>	0.6	0	0.2	0.2	1.5	1
<b>Male: average</b>	0.9	0.1	0.8	1.4	3.4	1.9
<b>Female: average</b>	0.9	0.3	0.4	1	2.7	1.5
<b>Overall Average</b>	0.9	0.3	0.5	1.1	2.9	1.6

**Notes:**

Goods and service contribute most to ΣEF: males and females consistently similar patterns of consumption.

**Table 7: Summary Tables**

<b>Sample 6</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1.1	6.2	1.4	8.6	16.5	9.2
<b>Female: max</b>	1.1	0.2	0.8	1.6	3.7	2.1
<b>Male: min</b>	0.7	0	0.3	0.3	1.7	1
<b>Female: min</b>	0.8	0	0.1	0.6	1.6	1
<b>Male: average</b>	1.2	1.5	0.5	2.4	5.8	3.2
<b>Female: average</b>	0.8	0.1	0.5	0.9	2.5	1.4
<b>Overall Average</b>	0.9	0.9	0.5	1.7	4.3	2.4

**Notes:**

One male who lives alone in a large home and consumes a very large quantity of goods and services has an ecological footprint of 16.5 hectares and generates a value of 9.2 for #P. This individual is the anomaly in this small sample.

**Table 8: Summary Tables**

<b>Sample 7</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1.1	0.2	0.5	1.1	2.5	1.4
<b>Female: max</b>	1.2	0.2	4.2	5.2	10.7	5.9
<b>Male: min</b>	0.6	0	0.1	0.3	2.6	1
<b>Female: min</b>	0.5	0	0.1	0.3	1	1
<b>Male: average</b>	0.8	0.1	0.3	0.6	2	1.2
<b>Female: average</b>	0.8	0.1	0.7	1.2	2.9	1.7
<b>Overall Average</b>	0.8	0.1	0.6	0.9	2.5	1.4

**Notes:**

One female who lives alone in a very large home generates a score of 4.2 hectares for shelter and she also has a very high consumption for goods and services (5.2 hectares). These yield an overall footprint of 10.7 hectares which translates into 5.9 for # Planets. This individual is a clear anomaly in the sample.

**Table 9: Summary Tables**

<b>Sample 8</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	0.7	0.8	0.5	2.1	4	2.2
<b>Female: max</b>	0.8	0.2	0.4	3.8	7	3.9
<b>Male: min</b>	0.5	0.1	0.1	1.2	0.8	1
<b>Female: min</b>	0.5	0	0.1	0.1	0.8	1
<b>Male: average</b>	0.6	0.3	0.3	1.1	2.4	1.5
<b>Female: average</b>	0.6	0.2	0.2	0.6	1.7	1.2
<b>Overall Average</b>	0.6	0.2	0.2	0.7	1.8	1.3

**Notes:**

Two individuals: one male, one female have significantly higher levels of consumption for mobility and good and services than the rest of the sample (0.8 and 2 for mobility, and 2.1 and 3.3 for goods and services). This pattern of consumption yields scores of 4 and 7 for ΣEF and 2.2 and 3.9 for # Planets.

**Table 10: Summary Tables**

<b>Sample 9</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1.1	0.4	0.6	1.2	3	1.7
<b>Female: max</b>	1.4	0.4	1.2	2.6	5	2.8
<b>Male: min</b>	0.8	0.1	0.1	0.3	1.6	1
<b>Female: min</b>	0.7	0	0.2	0.3	1.4	1
<b>Male: average</b>	0.9	0.1	0.3	0.6	2	1.1
<b>Female: average</b>	0.9	0.1	0.5	1	2.6	1.5
<b>Overall Average</b>	0.9	0.1	0.4	0.8	2.1	1.3

**Notes:**

Two females who live in very large homes have high consumption levels in all categories and yield high ΣEF scores as well as # Planet scores. The rest of the sample is consistently fairly modest in consumption patterns.

**Table 11: Summary Tables**

<b>Sample 10</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	0.9	0.7	0.8	1.8	4.1	2.3
<b>Female: max</b>	1.2	0.6	1.2	1.9	4.3	2.4
<b>Male: min</b>	0.6	0	0.2	0.2	1.2	1
<b>Female: min</b>	0.5	0	0.1	0.2	1.2	1
<b>Male: average</b>	0.8	0.2	0.5	0.9	2.5	1.4
<b>Female: average</b>	0.9	0.1	0.4	0.8	2.1	1.4
<b>Overall Average</b>	0.8	0.2	0.4	0.8	2.2	1.3

**Table 12: Sample Summary Tables**

<b>Sample 11</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1	1.7	2.4	5	8.3	4.6
<b>Female: max</b>	1.2	0.3	0.5	1.3	2.9	1.6
<b>Male: min</b>	0.8	0	0.2	0.3	1.3	1
<b>Female: min</b>	0.6	0.1	0.3	0.6	1.9	1.1
<b>Male: average</b>	0.9	0.3	1	1.7	3.8	2.1
<b>Female: average</b>	0.9	0.1	0.4	0.7	2.1	0.9
<b>Overall Average</b>	0.9	0.2	0.7	1.3	3.1	1.7

**Notes:**

There are 5 males who have significantly higher levels of consumption for goods and services, and shelter, and they have # Planet scores that range from 2 to 4.6.

**Table 13: Summary Tables**

<b>Sample 12</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	2.1	1.6	4.6	6.4	14.7	8.2
<b>Female: max</b>	2.1	2.1	4.6	6.5	14.9	8.2
<b>Male: min</b>	0.8	0.1	0.2	0.4	1.5	1
<b>Female: min</b>	0.7	0	0.5	0.6	1.8	1
<b>Male: average</b>	1.4	1.3	2.4	3.4	8.1	4.6
<b>Female: average</b>	1	1	1.7	2.9	6.7	3.7
<b>Overall Average</b>	1.1	0.9	1.9	3	7.1	3.9

**Notes:**

Most are expatriates who live in large homes. Typically they have high consumption of shelter, and goods and services. Only one male and one female have a modest consumption pattern that yields a # P as 1.0.

**Table 14: Summary Tables**

<b>Sample 13</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males: max</b>	1	0.8	1.8	3.1	6.6	3.7
<b>Female: max</b>	0.9	0.6	1.1	1.9	4.3	2.4
<b>Male: min</b>	0.9	0.4	0.7	1.4	3.3	1.8
<b>Female: min</b>	0.6	0	0.3	0.2	1.1	1
<b>Male: average</b>	0.9	0.4	1.1	2.1	4.5	2.5
<b>Female: average</b>	0.7	0.1	0.6	0.9	2.4	1.4
<b>Overall Average</b>	0.8	0.2	0.8	1.3	3.1	1.7

**Notes:**

One 21-year-old male who lives alone in a fairly large home has a very high ecological footprint of 6.6 hectares. He is the anomaly in this small sample.

**Table 15: All samples: Summary of results**

<b>Sample</b>	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>1</b>	2.5	3.8	6.1	9.7	22.2	7.8
<b>2</b>	2.5	4.5	3.5	8.3	16.7	6.5
<b>3</b>	1.9	1.7	4.1	6.4	8.5	5.8
<b>4</b>	0.9	0.9	0.5	2.1	4.7	2.6
<b>5</b>	0.9	0.3	0.5	1.1	2.9	1.6
<b>6</b>	0.9	0.9	0.5	1.7	4.3	2.4
<b>7</b>	0.8	0.1	0.6	0.9	2.5	1.4
<b>8</b>	0.6	0.2	0.2	0.7	1.8	1.3
<b>9</b>	0.9	0.1	0.4	0.8	2.1	1.3
<b>10</b>	0.8	0.2	0.4	0.8	2.2	1.3
<b>11</b>	0.9	0.2	0.7	1.3	3.1	1.7
<b>12</b>	1.1	0.9	1.9	3	7.1	3.9
<b>13</b>	0.8	0.2	0.8	1.3	3.1	1.7

**Table 16: Overall Summary Results**

	<b>F</b>	<b>M</b>	<b>S</b>	<b>G/S</b>	<b>ΣEF</b>	<b>#P</b>
<b>Males (70)</b>	1.16	1.19	1.52	3	6.76	3.23
<b>Females (90)</b>	1.13	0.86	1.16	2.17	4.1	2.63
<b>Total (160)</b>	1.19	1.07	1.55	2.93	6.24	3.02

We can compare the results shown on the Tables above with some hypothetical values. For example, for a person who could be considered as an extremely profligate consumer the values for F: M; S; G/S: EF; #P are 14, 14.4, 1.9, 32.6 and 27.9 respectively. Clearly none of those interviewed came close to this type of person, though some of the scores for EF and consequently #P are indeed high. The highest values for EF and #P are 49 hectares and 10.6 planets the size of earth. This person is male and a snowbird. The person who has the lowest scores is a female in sample 8, with scores of .08 hectares for EF and 1.0 for #P. On the other hand the hypothetical person with the lowest levels of consumption for each of the four categories yields scores of 0.4, 0, 0.2, 0.8, and 1.0.

With respect to the results shown on Table 15 it is clear that the three samples of snowbirds (1, 2 and 3) are by far the highest consumers in all categories, and they have very large ecological footprints that clearly are not sustainable if others in the world followed this pattern. Even at the scale of PV if many others followed this pattern of consumption then a heavy strain would be placed on the carrying capacity of the environments of Jalisco and PV. The sample of teachers (12) also has members with high ecological footprints; typically they are expatriates working as visitors in PV. Two other groups, Mexican visitors to PV (4) and the middle-age people (6), have fairly high ecological footprints. It is not surprising that the poor (7 and 8) have the lowest footprints. Other samples have average footprints that range from 2.1 hectares to 3.1 hectares.

There are a number of individuals in the total set of 160 whose footprints are small enough to generate a value of 1.0 for #P. At the aggregate level, when comparing average values, the results suggest that the consumption patterns are placing a high strain on the long-term carrying capacity of the environment and potentially contribution to the possibility of conflicts between the *haves* and the *have-nots*. The snowbird may be observed by the poor, and the former may wish to separate themselves from the latter through residential segregation and partition of space into areas of limited access to all. There are social consequences of such a pattern emerging on a large scale in PV which relate to safety and security, and which may have direct consequences on matters of justice, fairness, and equity.

From Table 16 it is clear that consumption patterns and hence the ecological footprints for males are considerably larger than for females for each of the four categories. The category of G/S is the one that yields the largest scores, while mobility has the lowest values. If the consumption patterns for shelter could be reduced (possibly by encouraging higher density living arrangements) and by reducing the consumption of goods and services, especially by males, then an overall reduction in average scores for the ecological footprint would occur. Clearly such behavioral shifts would not have to be made equally among all in PV. The poor, for example, should not be expected to shift their consumption patterns to anything like the same extent as the snowbirds, and members of samples 4, 6 and 12.

The challenges facing citizens in PV are first to raise awareness of all individuals to the concepts of sustainability and ecological footprint, and the effects of certain consumption patterns. Some may be aware but others clearly are not. Second, it will be necessary to encourage changes to behaviour, which will cause consumption patterns to be reduced and so reduce the size of the ecological footprint. This will mean some will have to voluntarily make changes in the expectation that their efforts will serve the greater good. This type of shift is probably very idealistic, but required, not just in PV, but at a global scale among citizens of rich countries to help all in the future. To this end it is vital that political and civil leaders, members of the media, teachers, civil society groups and individual citizens become more involved in civic conversations about sustainability and ecological footprints, and try to move toward action plans and away from rhetoric.

During the focus group session we developed a supplementary short questionnaire with a set of questions about the attitudes of interviewees on ecological matters. This questionnaire is shown in Appendix 3. The questions were used as prompts for a set of in-depth individual interviews with two selected groups namely teachers (8) and environmental planners (9). Eight members of the team also provided their views. A summary of the response to selected questions, defined as TOPICS, is given on Tables 17, 18 and 19.

**Table 17**

Overview of Responses: Teachers (8)

Topic #4

1	2	3	4	5	6	7	8
Conserve	Conserve	Recycle	Environment	Wildlife	Animals	Nature	Trees
Beauty	Re-use	Save Planet	Clean	Land	Water	Plants	Fish
Care	Save	Reduce	Plants	Ocean	Contain	People	Contain
Concern	Recycle	Re-use	Green		Health	Animals	Waste
Health	Reduce	Sustain	Wildlife			Caution	Roads
Balance	Science	Resources	Conserve				
Protection		Replant					

#5

V little	Don't know	V little	V little	Neutral	V little	V little	V little
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#6

Strong yes							
------------	------------	------------	------------	------------	------------	------------	------------

#7

1. air pollution + water pollution = disease: loss of species: pollution = ugly, low well being
2. important for future of city
3. must protect future generations
4. clean environment = tourists: dirty environment no tourists
5. to save environment and hence tourism in P.V.
6. – ditto –
7. to avoid destruction of planet
8. protect ecology to promote development

#8/9

Months ago	Last week	Today	Don't read	X	Today	Today	Long time ago
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#10

X	Parks Parking in PV	Parks Parking in PV	X	X	X	X	X
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**Table 18**

Overview of Responses: Team (8)

Topic #4

1	2	3	4	5	6	7	8
Pollution	Pollution	NGO's	Garbage	Garbage	Pollution	Environment	Sustain
Environment	Garbage	Green-peace	Pollution	Pollution	Animals	Pollution	Pollution
Garbage	Nature	Problems	Environment	Extinct	Environment	Natural	Human
Sustain	Corruption	Pollution		Animals	Life	Life	Devt
Corruption	Carrying-capacity	Work					

#5

Little	Neutral	V little	Neutral	Neutral	V little	V little	V little
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#6

Yes	Strong yes	Strong yes	Strong yes	Neutral	Strong yes	Strong yes	Strong yes
-----	------------	------------	------------	---------	------------	------------	------------

#7

1. individualism controls markets: need for awareness of collective sustainability
2. development and progress issues should be detached by politicians
3. government actions have been wrong : they should keep out
4. important for humanity and future
5. ditto
6. ditto
7. conservation and ecology good for tourism and the economy
8. government should lead in conservation of resources

#8

Today	Today	3 days ago	Never	3 days ago	3 days ago	Last week
-------	-------	------------	-------	------------	------------	-----------

#9

3 days ago	Last week	Last week	Last week	X	Last week	2 weeks ago
------------	-----------	-----------	-----------	---	-----------	-------------

#10

X	Urban chaos	X	Turtle project	Animals protection	Ecology worries heating of earth	Land use in P.V.
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**Table 19**

Overview of Responses: Environmental Planners (9)

Topic #4

1	2	3	4	5	6	7	8	9
Restoration	Nature	Science	Sustain	Plants	Balance	Flowers	Animals	Natural systems
Ecosystem	Health		Protect ecosystem	Air	Protection	Animals	Vegetation	Balance
Biosphere	Well-being		Recycling	Water	Fauna	Production	Flora	Sustain
Population			Science	Earth	Flora	Trees	Fauna	Dependency
Community				Well-being	Atmosphere	Landscapes		

#5

V little	Neutral	V little	V little	V little				
----------	----------	----------	----------	----------	---------	----------	----------	----------

#6

Strong no	Strong yes							
-----------	------------	------------	------------	------------	------------	------------	------------	------------

#7

1. to maintain flexibility regarding compliance with regulators
2. to ensure well-being, economy, politics, and economic development
3. to protect future
4. to protect vital local ecology system
5. to protect well-being and raise public awareness of the need for this
6. to ensure survival of humans through rational behavior
7. to use legitimate process to control environment to ensure well being
8. to promote science for the study of human survival
9. to avoid future problems if unbalance

#8/9

X	X	Yesterday	Today	Today	2 month	2 month	X	Today
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#10

X	Local/nat well being	X	X	X	Pres. Nat. resources	X	X	X
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There are a variety of words that come to mind when the term ecology is mentioned, including *sustainability, flora and fauna, conscience, corruption* etc. However, conspicuous by its absence is the notion of interdependence of all things and the cumulative effects of damaging an individual element of life on the planet. More needs to be done to raise public awareness of these points. However it is clear in the responses to topic 7 that there is concern about the future and recognition that continued exploitation of resources and the environment can have severe long-term effects on survival.

There is consistency in the views that politicians should be more involved in matters of environmental planning and raising awareness of ecology: at the moment they do little in these regards. While most of those interviewed read local and some national newspapers there were very few articles they recalled that specifically mentioned environmental damage, planning and public responsibility regarding damage and the consequences on QOL.

It is very clear that much more needs to be done to raise awareness about the concepts of ecological footprint and sustainability. And then possibly more and more citizens will encourage political leaders in PV to take initiatives to protect the future of this place. Currently the local media play a minor role in raising awareness of environmental matters in PV, and local politicians do not place much emphasis on this dimension of their activities. If this situation continues then there are likely to be long-term negative consequences, which deserve to be thought about now. If such consequences, which may effect the quality of life and economic prosperity in PV, are carefully considered, then as tourism grows, as is expected, land use developments especially relating to hotels, new residential areas, retailing activities and transportation, as well as agricultural activities near to PV and coastal zone land/sea/river interface management will be undertaken to ameliorate adverse conditions that exist, and projects to promote positive effects on the sustainability of PV will be promoted and supported by the public and private sectors. Both sectors need to co-operate and work with citizens and the media to ensure a sustainable future for PV.

## 4.0 Concluding remarks and future projects

In this research report we have begun to map and document the existence of a series of “footprints” within the “tourist space” of Puerto Vallarta, but there is still a lot of work to do before research on tourism in Vallarta is complete. For instance, the social spaces of PV have been investigated qualitatively, but could profitably be investigated quantitatively (perhaps using a factor analysis/principal components analysis of census data) and/or by mapping land uses (Ryder, 2004). This would enable us to compare the situation in Vallarta with other urban areas in Latin America and elsewhere. In addition a number of the other tourist footprints could be investigated in greater depth, for instance looking at the location and patronage of different kinds of restaurant (e.g. French vs. Mexican), or different “qualities” of restaurant (“fast” vs. “slow” food). Further research could also take place on the usage of the different hotels and plazas. In addition new footprints could be studied, such as red-light districts, golf courses and tourist recreational facilities.

Although the ecological footprint was investigated in a preliminary fashion in our research to date, more needs to be done with a greater variety of social groups, and a larger set of sample sizes. This research also needs to be extended to and applied within the areas and settlements surrounding Puerto Vallarta that are only now beginning to be affected by tourism and tourists (see Massam and Everitt, 2001; Massam, Everitt et al., 2003).

The next direction that this study could most profitably be taken, however, would be to extend its scope to include public services. Thus clinics and other health care facilities could be mapped and investigated, and public facilities that cater to the tourist/snowbird/expat population could be investigated. In addition other public services that serve the population that serves the tourists/snowbirds/expats could be documented and analysed. These are most likely to be located in, and having an impact upon, social areas barely touched upon by our research to date.

Clearly, our work has only begun to scratch the surface of tourist spaces in the Puerto Vallarta Urban Region. We hope that others will ‘pick up the baton’ and dig further below this surface.

## **5.0 Appendices**

### **Appendix 1: Ecological Footprint Quiz**

**How old are you?**

- <12
- 13-16
- 16-20
- 21-35
- 36-50
- 51-65
- >65

**How big is the city, town, or place where you live?**

- <1000
- 1001-10,000
- 10,001-100,000
- 100,001-1,000,000
- >1,000,000

**What city has the most similar weathers to yours?**

**Choose one:**

- Male
- Female

**Please enter your zip code. (Optional)**

**Email Address. (Optional)**

## Ecological Footprint Quiz

### Food Footprint

1. **How often do you eat animal based products? (beef, pork, chicken, fish, eggs, dairy products)**
  - Never (began)
  - Infrequently (no meat, and eggs/dairy a few times a week) (strict vegetarian)
  - Occasionally (no meat or occasional meat, but eggs/dairy almost daily)
  - Often (meat once or twice a week)
  - Very often (meat daily)
  - Almost always (meat and eggs/dairy in almost every meal)
  
2. **How much of the food that you eat is processed, packaged and imported?**
  - Most of the food I eat is processed, packaged, and from far away
  - Three quarters
  - Half
  - One quarter
  - Very little. Most of the food I eat is unprocessed, unpackaged and locally grown.

### Goods Footprint

3. **Compared to people in your neighborhood, how much waster do you generate?**
  - Much less
  - About the same
  - Much more

### Shelter Footprint

4. **How many people live in your household?**
  - 1 person
  - 2 people
  - 3 people
  - 4 people
  - 5 people
  - 6 people
  - 7 or more people
  
5. **What is the size of your home?**
  - 250 square metres or larger
  - 200 – 250 square metres
  - 150 – 200 square metres
  - 100 – 150 square metres
  - 50 – 100 square metres
  - 50 square metres or smaller

**6. Which housing type best describes your home?**

- Free standing house without running water
- Free standing house with running water
- Multi-story apartment building
- Row house or building with 2 – 4 housing units
- Green-design residence

**7. Do you have electricity in your home?**

- No
- Yes
- Yes, with energy conservation and efficiency

**Mobility Footprint**

**8. On average, how far do you travel on public transportation each week (bus, train, subway or ferry)?**

- 100 km or more
- 25 – 100 km
- 10 – 25 km
- 1 – 10 km
- 0 km

**9. On average, how far do you go by motorbike each week (as a driver or passenger)?**

- 250 km or more
- 100 – 250 km
- 25 – 100 km
- 1 – 25 km
- 0 km

**10. On average, how far do you go by car each week (as a driver or passenger)?**

- 500 km or more
- 300 – 500 km
- 150 – 300 km
- 50 – 150 km
- 15 – 50 km
- 0 km

**11. Do you bicycle, walk, or use animal power to get around?**

- Most of the time
- Sometimes
- Seldom

**12. Approximately how many hours do you spend flying each year?**

- 100 hours
- 25 hours
- 10 hours
- 3 hours
- Never fly

**13. How many litres per 100 kilometers does your motorbike consume?**

- 3 – 4 litres
- 4 – 5.5 litres
- 5.5 – 8 litres
- More than 8 litres

**14. How often do you ride your motorbike with someone else, rather than alone?**

- Almost never
- Occasionally (about 25%)
- Often (about 50%)
- Very often (about 75%)
- Almost always

**15. How many litres per 100 kilometers does your car consume?**

- Fewer than 4.5 litres per 100 km
- 4.5 – 6.5 litres
- 6.5 – 9 litres
- 9 – 15 litres
- More than 15 litres

**16. How often do you drive in a car with someone else, rather than alone?**

- Almost never
- Occasionally (about 25%)
- Often (about 50%)
- Very often (about 75%)
- Almost always

## Appendix 2: Commentary About the Questions in the Ecological Footprint Quiz

### PROJECTS: ECOLOGICAL FOOTPRINT ANALYSIS



Redefining Progress's Ecological Footprint Analysis measures the amount of renewable and non-renewable ecologically productive land area required to support the resource demands and absorb the wastes of a given population or specific activities.

#### Frequently Asked Questions

Your question not listed below? [E-mail it to us.](#)

- [\*\*Intent of the Footprint Quiz\*\*](#)
- [\*\*Quiz Accuracy\*\*](#)
  - [How accurate is the Footprint Quiz?](#)
  - [What's the measurement unit of the Footprint?](#)
  - [Is there a more precise calculator?](#)
  - [How do you calculate the Footprint?](#)
  - [Where do you get your data?](#)
  - [Your quiz seems to be designed for city people. Why this urban bias?](#)
- [\*\*Food\*\*](#)
  - [What does the Food Footprint include?](#)
  - [Why does the amount of meat and other animal products I eat make a difference?](#)
  - [How do eggs and dairy compare to meat and fish Footprints?](#)
  - [What about organic food?](#)
  - [What about free-range meat/poultry? What about meat I've hunted myself?](#)
- [\*\*Goods and Services\*\*](#)
  - [What does the Goods and Services Footprint include?](#)
  - [How is the goods and services Footprint calculated?](#)
  - [How can I reduce my Goods and Services footprint?](#)
- [\*\*Transportation\*\*](#)
  - [I don't own a car. How should I answer the quiz question about car fuel efficiency?](#)
  - [What does the Mobility Footprint include?](#)
  - [I drive a new car / old car, shouldn't this reduce/increase my Footprint?](#)
  - [In the Footprint quiz, should I count the distance I drive on a company car, or the amount I fly for business travel?](#)
  - [Do children count in ride sharing?](#)
- [\*\*Housing\*\*](#)
  - [Why does my footprint get smaller with more people in my household? Doesn't that imply that population growth is good?](#)
  - [What does the Housing Footprint include?](#)
  - [Why does the size of my house matter?](#)
  - [Why are different types of houses given different Footprints?](#)

- **Energy Use**
  - [Doesn't it matter how I heat my home or what my heating bills are?](#)
  - [What difference does the electricity source make \(nuclear power, renewable energy, fossil fuel\)?](#)
- **Location and Climate**
  - [Why does it matter which country I live in?](#)
  - [Why does it matter if I live in a city or a small town?](#)
  - [How does climate affect my Footprint?](#)
  - [Is it better to use heat in a cold climate or air conditioning in a hot climate?](#)
- **"Green" Practices**
  - [What about recycling?](#)
  - [What about composting?](#)
  - [Does a septic system \(or composting toilet\) reduce my Footprint?](#)
  - [What about other important, environmentally conscientious efforts I make? Shouldn't those reduce my footprint?](#)
- **Work and Income**
  - [What about the source of my income? Why doesn't my work affect my Footprint?](#)
  - [How is income correlated with the Ecological Footprint?](#)
- **Pollution and Toxics**
  - [Why aren't toxics and other pollution included?](#)
- **Population**
  - [What about population?](#)
- **Other**
  - [Why do you ask if I have a motorbike, electricity, and running water?](#)
  - [If I give you my e-mail address pledging to reduce my footprint or to involve others, will I begin to receive SPAM or other annoying e-mails?](#)

### **Intent of the Footprint Quiz**

The quiz is based on national consumption averages and is meant to give you an idea of your Ecological Footprint relative to other people in the country you live in. It is not highly detailed, but should give most people an idea of where they stand. If you already live a sustainable lifestyle, do not be discouraged by your results. There are some portions of your Footprint that are not the direct result of your consumption habits. For example, each resident of a city is 'responsible' for a portion of the city's infrastructure, such as roads, schools, and government offices, regardless of whether the resident uses those services. In addition, some options that could make your Footprint smaller are not available to you as a result of choices on the part of local decision makers, such as reliable and efficient public transportation as an alternative to driving. Therefore, an important path to reducing your Footprint is to advocate for more sustainable decisions at all levels of government. This will make it easier for you and many others to reduce Ecological Footprints.

### **Quiz Accuracy**

*How accurate is the Footprint Quiz?*

We consistently use conservative estimates in Footprint calculations. As a result they tend to *underestimate* human demand on nature. Also, as discussed under "pollution and toxics," various aspects for which data is scarce are not yet included in footprints, making them appear smaller

than they really are.

Our most accurate and comprehensive Footprint accounts are the national ones, since consumption and trade flows are best documented at the national level. Thereby, national Footprints can assess the demand on nature by all sectors of an economy, as well as the Footprint of the nation's consumption. The quiz computes your personal Footprint based on data from the national consumption Footprint. Although the quiz is not flexible enough to account for all possible lifestyles and circumstances, the 15 questions provide a reasonable estimate for most people. Adjusting your entries or playing with the "reduce your footprint" calculator on the results page of the Footprint Quiz will show how lifestyle changes affect the Footprint size.

*What's the measurement unit of the Footprint?*

Footprint results are expressed in global acres (or global hectares in metric measurement). Each of those acres (hectares) corresponds to one acre (hectare) of biologically productive space with world-average productivity. Today, the biosphere has 26.7 billion acres (or 10.8 billion hectares) of biologically productive space corresponding to less than one-quarter of the planet's surface. These 26.7 billion acres (10.8 billion hectares) include 5.7 billion acres (2.3 billion hectares) of productive ocean and 21 billion acres (8.5 billion hectares) of productive land.

*Is there a more precise calculator?*

Yes, you can download [a full Excel spreadsheet version](#) including the latest U.S. figures. The spreadsheet provides details for the components of each consumption category. It includes factors such as recycling, energy sources, housing construction and even how much tea or coffee you drink.

*How do you calculate the Footprint?*

We explain Footprint calculations in our [Calculating the Ecological Footprint](#) section.

*Where do you get your data?*

The analysis is primarily based on data published by United Nations agencies and the Intergovernmental Panel on Climate Change. Where government data is unavailable or spotty, we use peer-reviewed data from the scientific literature. For more information on specific data, data sources, see Components of the Footprint.

*Your quiz seems to be designed for city people. Why this urban bias?*

The footprint quiz attempts to measure the impact of individual or household consumption choices in the areas of food, shelter and mobility, regardless of where people are geographically located. Public transportation and bicycle commuting are often less practical in rural areas, making it challenging for those residents to reduce their mobility footprints. But rural areas also offer advantages for sustainable living, such as the potential to eat locally grown food.

[Return to top](#)

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## **Food**

*What does the Food Footprint include?*

The Food Footprint includes areas to graze animals, fish, and grow food as well as the energy to

process and transport the food.

*Why does the amount of meat and other animal products I eat make a difference?*

A plant-based diet generally requires less land, energy, and other resources. Crop-based food requires an average of 0.78 global hectares per ton of food, compared to 2.1 global hectares required to produce one ton of animal-based food. It is true that pasture and rangeland, the products of which humans can't directly consume, may be better suited to animals. Unsustainably managed grazing, however, can have degrading impacts on biodiversity and soil health.

*How do eggs and dairy compare to meat and fish Footprints?*

As with all food, the size of the Footprint depends largely on how it's grown. Look for "free-range" animal products that have been produced by local, small-scale organic or sustainable farmers. Visit the [Environmental Defense "Seafood Selector" website](#) or the [Monterey Bay Aquarium](#) for information about sustainable seafood choices.

*What about organic food?*

There are many benefits to organic agriculture that are not adequately captured by the Footprint accounts, such as avoiding pesticides and artificial fertilizers as well as protecting soil health and water quality. There is some controversy about whether organic agriculture is less productive per hectare. Our preliminary assessments show that this is not the case. If we include the footprints of pesticide and fertilizer inputs, non-organic agriculture comes out with a larger overall Footprint. Pesticides and synthetic fertilizers are highly energy-intensive, thus offsetting any possible yield increases from conventional agriculture. In addition, industrial agriculture can lead to water contamination due to nutrient loading from fertilizers and pesticide run-offs.

*What about free-range meat/poultry? What about meat I've hunted myself?*

Choosing meats that are raised free-range can benefit you and reduce the energy used in production. Grass-fed beef or bison for example are lower in total fat and calorie content and higher in Omega-3 fatty acids content (good fat). The choice of grass feeding over grain will save the resources, energy and therefore footprint devoted to producing and transporting the grain. Eating meat you've hunted yourself also reduces your footprint by eliminating the need to provide grain for animals and the energy to package and ship the products. Neither of these options is fully reflected in this quick quiz, but they would definitely reduce your footprint.

[Return to top](#)

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## **Goods and Services**

*What does the Goods and Services Footprint include?*

This category includes consumer goods like appliances, clothing, electronics, sports equipment, toys, computers, communication equipment, household furnishings, and cleaning products. It includes services like water, sewage, garbage, telecommunications, education, health care, financial services, entertainment, recreation and tourism, military, and other government services. Since industrial lifestyles increasingly depend on services and are characterized by the use of consumer goods, this Goods and Services portion of the footprint can become a significant piece of the overall footprint.

*How is the goods and services Footprint calculated?*

To calculate the Goods and Services Footprint for an individual taking the quiz, we first calculate the ratio between the national average per capita Goods and Services footprint and the national average per capita food, shelter, and mobility footprint subtotal. Then we apply this additional footprint proportionally to the sum of the user's personalized food, shelter and mobility Footprints.

*How can I reduce my Goods and Services footprint?*

This Footprint quiz assumes that goods and services are proportional to the other three activity areas of food, housing and mobility. Lowering these latter three activities therefore reduces the Goods and Services Footprint in the Quiz results. We recognize that this simplified assumption may not describe all lifestyles adequately. There are many more possibilities to reduce the Footprint of goods and services. For example, the "reduce your footprint" section on the Footprint Quiz's results page allows you to directly assess the footprint reductions of some specific goods and services.

[Return to top](#)

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## **Transportation**

*I don't own a car. How should I answer the quiz question about car fuel efficiency?*

We realize that many people don't own cars, and we applaud the decision to be car-free, and to share, borrow, or rent cars when needed. If you never travel by car, or travel 10 miles a week or less, you will not get the quiz questions about fuel efficiency and occupancy. If you travel in a car 10 miles a week or more, we ask you to estimate the average fuel efficiency of the vehicles that you ride in or borrow during the year. The average fuel efficiency of the US car fleet (new and old vehicles) is about 20 miles per gallon. Bigger, heavier cars like sport utility vehicles tend to have lower fuel efficiency, while lighter, compact cars have higher fuel efficiency.

*What does the Mobility Footprint include?*

The Mobility Footprint includes all aspects of personal mobility, from walking to riding bicycles, taking trains, driving cars and flying planes. These activities occupy space for road infrastructure, energy and resources for building the infrastructure and manufacturing the vehicles, and energy for operating them.

*I drive a new car / old car, shouldn't this reduce/increase my Footprint?*

This depends on how much you drive and the fuel efficiency of your vehicle. Producing a new vehicle requires a substantial amount of energy and materials. Typically in the US, the embodied energy for producing the car corresponds to 10 to 15 % of the energy a car uses over its lifetime for gas. Maintaining an older vehicle will thus save the Footprint of producing a new one.

If you drive frequently, the fuel efficiency of your vehicle becomes an important factor. New vehicles are not necessarily more energy efficient than older models, since models are often getting heavier and equipped with more frills. The weight of a vehicle, and the size of the engine are key determinants of the fuel-efficiency of a car. If you are planning to buy a car, whether new or old, look for a fuel-efficient model, or consider car-share alternatives.

*In the Footprint quiz, should I count the distance I drive on a company car, or the amount I fly for business travel?*

You can decide how to allocate your transportation footprint. We do account for some business travel in the Footprint of the goods and services produced. Therefore, if you want to allocate business travel to the Goods and Services sector, only count your personal travel and commuting. If you want to claim responsibility for your business travel, enter the full amount. Flying does have a large impact on your Footprint.

*Do children count in ride sharing?*

If passengers are avoiding taking an additional vehicle, then they share the Footprint cost. This reduces the Footprint per person. Bringing the kids with you shopping, however, should not be considered ride sharing.

[Return to top](#)

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## **Housing**

*Why does my footprint get smaller with more people in my household? Doesn't that imply that population growth is good?*

Increasing the size of your household means sharing the household's energy consumption among more people, reducing each household member's housing footprint. This is not to say that adding to your family is an effective strategy to reduce energy consumption. Having children necessarily increases society's overall footprint, and can increase individual footprints as well, through decisions made in order to accommodate an expanding household (bigger car, bigger house). Population growth shrinks the amount of the Earth's available resources per person. ([See "What about population?"](#))

*What does the Housing Footprint include?*

The Housing Footprint covers the spaces for built-up land, the energy and resources for constructing the building, and the energy for operating it. In our accounts, this category does not include the furniture, appliances, or cleaning equipment, which are accounted for in the ["Goods and Services"](#) section.

*Why does the size of my house matter?*

The resources required to build, maintain, heat, and cool a house increase with larger housing sizes.

*Why are different types of houses given different Footprints?*

Different housing types and building techniques affect the housing footprint due to their relative energy efficiencies. For instance, shared walls reduce exposure to heat and cold, and therefore reduce energy consumption. Green design techniques maximize the energy efficiency of housing.

[Return to top](#)

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## **Energy Use**

*Doesn't it matter how I heat my home or what my heating bills are?*

It does matter. For simplicity, we use the size of your home, your local climate, and housing type

to estimate your housing Footprint. In general, your utility bills are a good measure of this portion of your Footprint. See our more detailed household Footprint calculator for a more accurate housing Footprint, including questions about the type and amount of fuel used.

*What difference does the electricity source make (nuclear power, renewable energy, fossil fuel)?*

All electric power sources have a Footprint for their construction and operation. The combustion of fossil fuels for electricity generates carbon dioxide, among other wastes and serious environmental effects. Coal-powered electricity generation has a bigger Footprint than electricity from natural gas. Using electricity from renewable "green" sources like wind, solar, and small-scale hydropower substantially reduces your Ecological Footprint. You can calculate the effect of using them with the U.S. based Excel spreadsheet that allows you to do more precise assessments of your Footprint.

The Ecological Footprint of nuclear power is more controversial. On the one hand, nuclear power does not generate carbon dioxide emissions, aside from the energy embodied in a nuclear plant's construction and maintenance. On the other hand, it does create wastes that must be dealt with over many thousands of years. Accidental contamination from nuclear energy, such as at Chernobyl, has made sizeable areas of productive land unfit for human use. In addition, there is a security concern, since radioactive material can be used for weaponry. Our current approximation of these variables gives each source an equal impact per energy unit. Taking nuclear energy out of the Footprint accounts would reduce the worldwide Footprint by less than four percent.

[Return to top](#)

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## **Location and Climate**

*Why does it matter which country I live in?*

Each country has its own average Ecological Footprint specific to its economy, consumption patterns, and technological efficiencies. We use national Footprint data, and information about regional variations in climate, heating, home construction styles, transportation, etc., to develop a Footprint quiz tailored to each country.

*Why does it matter if I live in a city or a small town?*

This information helps us differentiate between urban and rural residents, since access to appliances and amenities is typically lower in rural areas, particularly in non-industrialized countries.

*How does climate affect my Footprint?*

Climate affects the amount of energy used for residential heating and cooling.

*Is it better to use heat in a cold climate or air conditioning in a hot climate?*

Energy use and its associated Footprint is roughly proportional to the price paid. One hundred dollars of heating is no better or worse than \$100 in cooling. Not all energy sources are equal however. Renewable energy sources and conservation and efficiency practices can substantially reduce your Footprint.

[Return to top](#)

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## "Green" Practices

*What about recycling?*

Recycling is incorporated into the footprint calculations through the question about trash. Households that recycle, reduce and reuse will throw out less than average households in their area. Recycling diverts materials from the solid waste stream and landfills. Using recycled materials to make new products saves energy and resources. For recycling to work, people need to buy recycled products. Even more effective, of course, is to reduce consumption and re-use products when possible. Look for durable, long-lasting, and used or second-hand products. Avoid disposable items with lots of packaging. Extend product life through maintenance and repair.

*What about composting?*

Composting is a great alternative to throwing food waste into your garbage. Garbage that is not contaminated with wet, degradable (biological) waste will be far less hazardous, can more easily be recycled and sorted, and does not produce methane gases (with a significant greenhouse gas potential) when stored in a landfill. If incinerated, uncontaminated waste will burn cleaner and produce more energy. At the same time, composted kitchen waste will help to rebuild soil for your garden. Everybody wins, and it is a fun science experiment for the kids.

*Does a septic system (or composting toilet) reduce my Footprint?*

Well-functioning compost toilets will reduce your Footprint. The quiz, however, is not yet sensitive to this choice. In the U.S., sewer, water and garbage collection combined is equal to about 10% of the food component of a person's Footprint. The Footprint of sewer and septic systems consists largely of the "built up" land and energy used to construct and operate them, and then dispose of the remainders.

*What about other important, environmentally conscientious efforts I make? Shouldn't those reduce my footprint?*

Every conservation effort is beneficial, and the Ecological Footprint quiz is a learning tool that only evaluates the impact of some activities, leaving others out. Water conservation, reducing, reusing, recycling, planting trees, using eco-friendly soaps and household cleaners, growing gardens, green investment, charitable giving to organizations working for social change—and many other activities—all play an important role in making the world a better place.

[Return to top](#)

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## Work and Income

*What about the source of my income? Why doesn't my work affect my Footprint?*

The Ecological Footprint Quiz assesses the impact of your consumption. Workplace Footprints are counted through goods and services at the point of consumption. In other words, they are attributed to the people who consume your products or services. This means that the Footprint of the government and the services it provides are attributed to your consumption of goods and services.

Businesses can use Footprint calculations to identify resource inefficiencies in their production of

goods and services. Footprints can also be applied to individual products to help consumers make more ecologically sustainable choices.

#### *How is income correlated with the Ecological Footprint?*

Internationally, higher average incomes are correlated with larger Ecological Footprints. Income alone, however, is not an accurate measure. Most other high-income countries have about half the per capita Footprint of U.S. citizens. The Footprint is generally more proportional to the size of a person's residence and travel habits. Little, if any, accuracy is gained by including additional questions about income.

[Return to top](#)

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### **Pollution and Toxics**

#### *Why aren't toxics and other pollution included?*

The Ecological Footprint does not document our entire impact on nature. It only includes those aspects of our waste production and resource consumption that could potentially be sustainable. In other words, it shows those resources that within given limits can be regenerated and those wastes that nature can break down. For all activities that are systematically in contradiction with sustainability, however, there is no Footprint since nature cannot cope with them.

For instance, there is no sustainable regenerative rate for substances such as heavy metals, persistent organic and inorganic toxins, radioactive materials, or bio-hazardous waste. For a sustainable world, their use needs to be phased out. In other words, the Footprint calculation assumes that you do not engage in systematically unsustainable activities such as the release of CFCs, the unsafe disposal of motor oil, or the purchase, use and disposal of other harmful household chemicals.

[Return to top](#)

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### **Population**

#### *What about population?*

The Ecological Footprint Quiz only shows an individual's impact. To calculate the overall impact of our species on the biosphere, we need to add up the Ecological Footprints of the Earth's entire human population. Since the size of the biosphere is finite, the greater our world family, the less nature per person.

If people have, on average, more than 2 surviving children, the population will increase. That's the mathematics of population growth. In societies with a large per capita consumption, just maintaining current population size may not be compatible with sustainability if there is no significant reduction in the average Ecological Footprint. In other words, we must address both our population size and the size of our Footprints in order to keep our planetary use of natural resources in balance.

What would happen if the factors leading to population growth changed? Below is some simplified data for the mathematically inclined, illustrating how the number of children families have affects the global population.

<b>World Population</b>	
<b>Year</b>	<b>Population (in billions)</b>
1800	1.0
1900	1.7
<b>2000</b>	<b>6.1</b>
2100: a range of possible scenarios	
a) with one-child families	1.4
b) with two-child families	8.7
c) at year 2001 growth rate	22.2
<i>Note: 1 billion = 1,000 million = 1,000,000,000</i>	

### **How are the three scenarios for 2100 calculated?**

The tables below provide highly simplified demographic models for calculating the implications of varying birth rates. The column for the year 2000 shows a rough age distribution of the human population today. Population values provided are gross worldwide estimates, in billions of individuals.

a) *One-child families.* If families were to have one child each, the 2.9 billion "children" will produce 1.5 billion offspring once they become parents. If the population would move back to 2-child families in 2100, the population would stabilize within about 50 years at 600 million people.

	<b>2000</b>	<b>2025</b>	<b>2050</b>	<b>2075</b>	<b>2100</b>	<b>2125</b>	<b>2150</b>
Grandparents (51+ years)	1.1	2.1	2.9	1.5	0.8	0.4	0.2
Parents (26-50 years)	2.1	2.9	1.5	0.8	0.4	0.2	0.2
Children (0-25 years)	2.9	1.5	0.8	0.4	0.2	0.2	0.2
<b>TOTAL (billion)</b>	<b>6.1</b>	<b>6.5</b>	<b>5.2</b>	<b>2.7</b>	<b>1.4</b>	<b>0.8</b>	<b>0.6</b>

b) *Two-child families*: If the 2.9 billion people between 0 and 25 years were to reproduce at replacement fertility, all three age categories would eventually grow to 2.9 billion each. This would lead to a world population of 8.7 billion people by the year 2050.

	2000	2025	2050	2075	2100	2125	2150
Grandparents (51+ years)	1.1	2.1	2.9	2.9	2.9	2.9	2.9
Parents (26-50 years)	2.1	2.9	2.9	2.9	2.9	2.9	2.9
Children (0-25 years)	2.9	2.9	2.9	2.9	2.9	2.9	2.9
TOTAL (billion)	6.1	7.9	8.7	8.7	8.7	8.7	8.7

c) *Maintaining current growth rate*. In 2001, the growth rate (birth rate minus death rate) of the world population was 1.3 percent per year. If this rate of growth were to remain constant into the future, there would be 22.2 billion people on Earth in the year 2100.

	2000	2025	2050	2075	2100	2125	2150
Grandparents (51+ years)	1.1	2.1	2.9	3.4	5.3	7.4	9.5
Parents (26-50 years)	2.1	2.9	3.4	5.3	7.4	9.5	13.8
Children (0-25 years)	2.9	3.4	5.3	7.4	9.5	13.8	19.0
TOTAL (billion)	6.1	8.4	11.6	16.1	22.2	30.7	42.3

Data derived from: UN Population Division, <http://esa.un.org/unpp>, "World Population Prospects" (World population database, 2000) and Population Resources Bureau, <http://www.prb.org>.

[Return to top](#)

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## Other

*Why do you ask if I have a motorbike, electricity, and running water?*

This survey was created with a global population in mind. Therefore, we considered the lifestyles of people all over the world, many of whom use motorbikes as their main form of transportation, or live in homes without electricity or running water.

*If I give you my e-mail address pledging to reduce my footprint or to involve others, will I begin to receive SPAM or other annoying e-mails?*

Absolutely not. Your email address will not be sold to anyone. It will be used solely for tabulating quiz results and pledges, to lend weight to policy recommendations at the World Summit on Sustainable Development. For a more detailed disclaimer, please see the ["Privacy Policy" link](#).

You do have the option of subscribing to our announcement list and e-mail letters through an entirely separate and distinct process. If you wish to sign up for an Ecological Footprint newsletter, or to receive announcements from Redefining Progress, [click here](#).

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### **Appendix 3: Questionnaire on Opinions About Ecology**

1 NAME: (optional)

2 EDUCATION: highest level

3 WORK/EMPLOYMENT/JOB

**TOPIC 4** WORD ASSOCIATION WITH *ECOLOGY*: list 5 key words

**TOPIC 5** ARE POLITICIANS IN PUERTO VALLARTA CONCERNED ABOUT ECOLOGY?

**TOPIC 6** SHOULD POLITICIANS BE CONCERNED ABOUT ECOLOGY?

**TOPIC 7** IF YES ....WHY? ....IF NO ....WHY?

**TOPIC 8** WHEN DID YOU LAST READ IN A LOCAL PAPER ANYTHING RELATED TO ECOLOGY/ENVIRONMENT?

**TOPIC 9** WHAT DO YOU RECALL FROM THIS/THESE ARTICLES?

*NOTE: TOPICS 4-9 are used on Tables 17, 18 and 19*

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