Week 9
Online Course: PROMESAN SustR

**Case Study: Population and Environment of the State of Aguascalientes**

**Objectives:**

Students will know the general characteristics of the environment and population within the state of Aguascalientes in Mexico.

Students will analyze the main socio-economic and environmental issues within the state of Aguascalientes.

At the end of the suggested readings, the students will know, comprehend and evaluate the main proposed paradigms regarding the processes of sustainable development.

From this information, the student should:

Elevate their level of awareness (current and future) about the environment and the development crisis that earth faces, including the roles of the agents that cause them, as well the solution alternatives that readings offer.

Increase their knowledge and understanding about the natural and social science required to understand the global perspective of the ecological, economic, and social changes.

Adopt an ethic based on responsibility.

Make a commitment as an agent of change in the generation of sustainable alternatives.

Enable students, through the transformation of their thinking patterns, to generate alternatives that guide us towards sustainability.

**Main Readings**


First Topic: The concepts of sustainable and sustained in agriculture

In general terms, “sustained” will be applied to the type of agriculture in which production could be maintained through external inputs, in contrast, “sustainable”, will be applied to agriculture perpetuates itself by internal system factors, with no need for external additions.

The concept of sustainability, and any other definition that is applied, is not new; it is rather a concept that has been misunderstood permanently through human history.

The most classic example is the nomadic or transhumant system, in which land was cultivated one season -without the need to use external inputs- and was let rest so that it could recover its fertility. This system works in low pressure demographic conditions, as it does not break with the ecological balance and it is also a viable model to not overexploit or destroy ecosystems.

The future success of the national strategies of the sustainable development of conservation require peace, freedom, social justice, democracy, scientific and technological progress a healthy economy and an ethic of individual and collective responsibility to promote human solidarity, citizen participation and environmental stability of the planet.

Wilken, a renowned scientist specializing in agro-ecosystems, makes an analysis about the sustainable agriculture concept, and, in 1991, pointed out the bottleneck issues for its application. The author underlines that the sustainable primary approach should be agronomic because, if the concept grows, it runs the risk of confusing ecologic processes with socially defined concepts.

Sustainability should take as its base the resources that give place to the production and the means for its conservation, since neither the productivity nor the quality of life can be maintained if the production systems are not ecologically established.

Gliesman, another specialist in the same field, describes this approach as “the long-term productivity optimization”, instead of short-term maximization. This new approach uses more realistic population dynamics models which take into consideration the interactions between individuals and species within their environment.

It is for this reason that the agricultural field and farm are the two first levels in the organization of hierarchically that defines the agro-ecosystems. If sustainability is not reached in the lowest levels, it will less likely be reached in the higher levels. So, long-term programs are required that are oriented to the systems designs, not only isolated modifications.
The production sources, land, water, and air, should be managed to increase their productivity and maintained for the long term. However, this has a cost and a deadline; a continuous production depends on the continuous maintenance of the resources in which the production is based. Population growth and increased consumption levels represent an increasing demand for food, fiber and forest products, threatening the planet's capacity to meet the minimum requirements in the near future.

Since arable land is insufficient to meet future demands, the use of marginal lands susceptible to degradation is increasing. The solution lies in management systems with which it acceptable levels of production can be obtained in different types of land. The concepts of agriculture, livestock and forestry should be destroyed, avoiding the antagonism that now exists between them, and creating diverse production units and multiple applications.

A new classification of land that includes the potential management for sustainable production is needed. Therefore, is necessary to solve conflicts arising from production and conservation, resource allocation, short-and long-term objectives, differences in perspective of the participants and stochastic factors in time and space.

On a sustainable production both economic and ecological factors are involved, and require integrating production and conservation. For this, new indicators and monitoring methods must be developed, land arrangement and different management methods for each soil use. Self-sustainability is the long-term solution; it is achieved when the practices of conservation of basic resources and surplus (which promote the increase in production), are maintained through economic incentives.

Although, both production and conservation are desirable goals, so far they have been handled antagonistically. Agriculture interferes transforming the ecosystem, changing vegetation patterns, disturbing the soils and altering the water stress and geochemical balances. Some practices are more harmful than others but, potentially, all of them can put an end to the resource and degrade the environment. To balance the negative effects it is necessary to invest time, energy and resources in the maintenance of cropping systems. These additional costs are focused on the preservation or restoration of fertility, reducing the disturbance levels of soil or vegetation. These costs weigh heavily on the production or profits.

To be sustainable agriculture must be ecologically rational, economically viable, socially fair and politically supported. The requirements of plants and animals
define the conditions that determine the agronomical sustainability. These conditions are relatively constant over time and space. The conditions that determine the social or economical sustainability are based on knowledge of social values that, in time, vary between cultures and countries.

Agriculture is the basic activity that unites the social systems in production, distribution and consumption networks. Points of view vary, and the objective of farmers may differ from that of industrials, governors, and consumers. An objective of the government may be to increased production to meet export demand and earn foreign exchange. Producers have learnt that an increase in production can lower prices and reduce profits. Low prices may force producers to increase production, only in order to maintain profit levels, without taking into account the effects on the conservation of resources. In parallel, the emphasis on export crops reduces the resources for the domestic food production, with a consequent negative impact on consumers, who are forced to buy imported food at high costs.

Agriculture operates simultaneously in the fields of ecology and economy, even though each one has different response times. The production is linked to the variety of the production cycles of goods, from vegetables and seasonal and annual cereals, to perennial species such as shrubs and trees. The handling of animals ranging from short-lived species (birds) to long-lived species such as cattle and sheep.

The crops are harvested and sold each season or year, and prices can vary dramatically from one harvest to another. The producers are working blindly, because they have to start the cultivation of specific products months or years before having an indication of future.

The economical accounting of ecosystems is poorly developed, although the costs of most conservation measures are known, the benefits are only rough estimates. The feedback between gains and losses should enhance the sustainability practices.

Sustainable farming is not only worthwhile, but inevitable. Sustainability seems to be the focus of agricultural development efforts for the rest of the millennium and the hope for the next century. The challenge is not to convince, but to solve conflicts and remove obstacles in the implementation of sustainable agriculture. For this, it requires new approaches and methodologies.

Sustainable agriculture does not exclude the use of fossil fuels and chemicals, only requires the properly application and in favor of sustainability.

Organic agriculture or biodynamic is the common practice of sustainable
alternatives and is based on the maintenance of soil fertility without addition of chemicals, residues and plants used in the preparation by decomposition of natural fertilizer (mulch and compost). The concepts of agro-ecology, perma culture and regenerative agriculture are based on ecological systems theory, in the coexistence of various crops and maintenance of plant cover.

A common consensus today is that industrial agriculture is inefficient and unsustainable in long term. The immediate challenge is to identify the basic changes we must make in agricultural systems in order to reach sustainability; but, what is going to be sustained? Who will sustain it? How, how long, and at what cost? Perceptions are very different for agronomists, biologists and alternative foresters, soil, groundwater, habitats, communities, germplasm and biodiversity must be sustainable fields, other professionals will give more weight to other elements.

Ecological principles for agroculture development

As we said earlier, on the social section, some principles to define a general strategy that would lead us toward sustainability can be set, even though there are gaps in knowledge.

Soil quality: In the design of agro-ecosystems, should be take into account to maintain the soil fertile and with a plant cover most of the time; and many perennial crops perform efficiently this task. Species with deep roots create a net movement of nutrients to the surface, making them available. There should be a recycling of organic matter and biological sources of nutrients in the soil.

Eco-efficiency: Systems that use solar energy and recycle nutrients effectively save money and prevent pollution. Efficient use of energy mechanisms should be used, for example, polystratified systems, use of animal power, scheduling of activities, etc. The use of remaining varieties, organic sources of nitrogen, among others, minimizes input costs.

Stability of the agroecosystem. Internal balances depend on the feedback, whether positive or negative, and the length of the cycle, with short cycles that give more stability to the system. That is, management actions must consider combinations of species and succession cycles of the natural vegetation. Preventive actions should be made and implemented as a problem is identified, allowing a fine adjustment to local conditions. This will require monitoring methods of agro-ecosystems that determine the state of the crop, soil, pests, and so on.
Diversity. For the development of agro-ecosystems, a cornerstone is knowledge of biodiversity. There are several ways to manage diversity. It can handle several species simultaneously, in which case, the spatial arrangement of these is important for the efficient use of light, water and nutrients. With a diversity of crops in time remains in the soil coverage. The genetic variability within and between cultures, can help protect the species of pests and diseases. Moreover, the genetic diversity of natural ecosystems functions as a source of genes for the improvement of existing varieties to create new from them.

As we have seen so far, the sustainability of natural resources is closely related to the conservation and use of resources. In Table 25.3 we can see the wide range of issues to be considered for ecologically sound development.

If we start from the idea that conservation of natural resources in the long term will depend on continued and sustained use permitting its renewability, we are talking about sustainable development. Why this statement?, Because somehow other natural resources are satisfiers of basic needs not only economic or (food, medicine, clothing and other commodities), but recently aided the intangible values social, environmental and cultural that nature provides. Here is forced to include the element of time and discuss not only the present but the future.

All definitions of sustainable development given the idea of "maintaining" and this is not entirely true, since what it is sustainably improve the level and quality of life for humanity as a fundamental goal. To take this to the field of biology that we can see from the standpoint of economic development involves the consumption of energy and raw materials, creating an ever greater amount of toxic waste in a high percentage, that the planet is not and in a position to absorb. That is, growth that is required from the economic point of view is not necessarily green, nay, which has prevailed until now is not the "green growth". What does this mean? that sustainable development implies change, not so radical and unilateral as they have done so far, but changes must be based on a series of commitments that require strategy, order and ethics.

Perhaps a more practical example so we can see in a forest harvesting.

Once the forest harvesting starts, a change in the structure and composition of the forest system is implied, and sustainability does not necessarily mean the identical reproduction of the ecosystem in its original state. However, the management tends to play these species are those that exploit and not others. Sivicultural
techniques for thinning, enrichment planting and help us keep the sustainability of a particular resource, but of course, that changes occur.

When talking about sustainable development from the biological standpoint, obviously we have to refer to forests, as they constitute the most abundant renewable resource we have. In addition, his range of influence is enormous, although the situation can physically and politically delimited territory, their environmental impact transcends borders and has regional or global. It is for this reason that, within the biological, the forest ecosystem is the best opportunity to lead the practice of sustainable development Worldwide.

However, in this area and at least in Latin America presents a paradox: despite the cycles of forest use are long-15 years, shorter than 30 or more longer, we are not yet familiar with the concept of sustainable yield. In our country we have a magnificent setting for the realization of a comprehensive and multiple use of forests, however, has traditionally been done as if it were a type of mining (extraction and processing only.) Some countries with forest tradition as Finland and Canada have learned their lesson and are in a position to put the example.

What is required to make full use multiple and sustainable forest?

Expanding the vision of a sustainable yield towards sustainable development, which involves shifting the management of forests, forest ecosystem management. What do we mean by this? we switch from using wood constantly and by perpetuating human use, incorporating the management of forests to maintain ecological integrity of the environment with a clear reservations for the future and how this could be done?

It can be done simultaneously in one area or giving a differential use of various areas, awarding each a principal value while recognizing the secondary, ie, have forest for timber and firewood, protection and management fauna, among others.

The word forest is used in its broadest sense, i.e. includes forests, and coastal ecosystems, timber and timber products.

Maini, in 1989, provides a special definition of sustainable development for forest lands:

"Sustainable development of forest land and its multiple economic and environmental values, means maintaining indefinitely, without an unacceptable decline, both the ability to produce and renew itself, as well as the species and ecological diversity of forest ecosystems".
The term decline is one that can be subject to interpretation, and should be based on knowledge of the ecological principles, and socioeconomic imperatives, weighing the risks of action against the costs of inaction.

From an ecological point of view, all forests are composed of a mixture of species, more or less fragile, which supports it, which is part of a complex system based on geographic region where they are, and has the ability to renew itself. Moreover, by being a forest ecological systems with a long life and a great ability to renew itself, they can withstand a wide range of natural disturbances related to climate (drought, excessive moisture, snow) or natural disasters (fires, storms, pests and diseases), these changes are part of the dynamics of natural ecosystems and also have a role in its health, vitality, dynamics and species replacement and renewal, all of which leads to an evolution in time. The mosaic structure of forests and jungles accurately reflects these past disturbances attributable to natural causes.

When talk about sustainable development of forests, rather than deal with the changes experienced by them over time, we must pay attention to the responsibilities of human activity. It is important to note here that the conservation of large masses of forests in developing countries is similar to that experienced by developed countries with temperate forests in past centuries. It is also essential to review the land tenure and use the resolution of this problem, returning and recovering the so "demonized" communal ownership of land, which took place in the sixties via the document of the Tragedy of the Commons.

The fundamental principle of sustainable development from the biological standpoint, is to recognize the limitations of the changes that may be imposed on nature and the organization of human activities so as to produce the greatest benefits possible within those limits. Once this recognition has been made, it is necessary to consider three limitations.

**Limitations**

*Ability to produce*

Overall, productivity is a function of the number of species and individuals to grow in it, soil fertility, nutrient reserve, biomass and climate.

The fourth factor, which refers to the biomass, can be very relevant at the time of natural resource extraction because it impacts the nutrient reserve. If you have poor soil, as is the case with jungles, the next harvest will be greatly reduced.
**Ability to renew**

The renewability of an ecosystem after it has undergone any change, depends on the nature and intensity of the same, and how to reproduce the species in question.

Example:
Self-regulating. High rate of native species / introduced

![Diagram of ecosystem types and benefits](image)

Figure 1. Benefits provided by natural ecosystems, both modified and artificial. The benefits offered by different systems are shown in the boxes on the left. Arrows indicate trends in relation to the regulatory agent. To the extent that we depart from the natural system, man is more involved in their regulation and the number of introduced species rises in relation to native species. The dotted line
marks the limit of sustainability; below this line are degraded systems, which are unsustainable.

There are some ecosystems that are more fragile than others, and each forest or jungle may react differently, depending on whether or not they go beyond the limits of tolerance. In this regard there are three known types of reaction:

**Self-renewal**

At the time that a moderate degradation is removed, the ecosystem can renew itself more or less rapidly, and reach the state it was before human intervention.

**Rehabilitation**

If degradation is stronger, the natural system may require longer natural recovery times, making them prone to be shortened by human intervention.

**Restoration**

When the disturbance has degraded severely, the environment change that occur is irreversible at least in terms of human life; it is characterized by loss of forest cover, species and soil. Under these extreme conditions can take centuries to recover if you leave this work only to nature but with human intervention this work can be accomplished in decades. The two alternatives are recreating a forest with diverse species and the closest thing to the originals, although never recovering the original vegetation, or promoting plantations on these degraded lands.

The ability to achieve sustainable forest development depends on having a good prognosis of ecological effect of natural disturbances and man-made ones on the natural ecosystems. This ability to forecast is closely related to the ability to learn from the lessons of the past, i.e., forests that had no type of organization with well-managed forests, with minimal disturbances.

We cannot talk about sustainable development without maintaining forest ecological reserves that are representatives, as a basis for comparison.

**Action measures for sustainable forestry development**

Take full advantage of all existing knowledge on integrated management of forest ecosystems and create a national and international network of demonstration areas.

Expand research to predict the response of forest ecosystems to disturbances associated with natural causes and human activities, and perceive the early signs and degradation of forest ecosystems.

Accelerate the development of systems of national and international surveillance, that provide timely reliable information on the status of national and global forests.

Promote the creation or strengthening of national systems of ecological reserves in of the forestry type being represented, or unique, to protect biodiversity and ecological diversity and provide terms of comparison of the consequences of human activity on the environment.

To increase the productivity of certain areas through an accurate management of forests and plantations, while reducing losses caused by fires, insects and diseases, in order to make more land available for other uses, without reducing the total wood production.

Reduce waste in logging operations and wood processing, improved utilization of wood for a wider range of finished products, encourage the reuse, whenever possible, to reduce demand for raw materials and to "do more with less."

Limit, to environmentally acceptable levels, the discharge of manufacturing waste liquids (effluent) that are based on forest products.

Reduce pollutants from industrial and consumer activities that cause damage to forests by reducing productivity, renewability and ecological diversity and of the species.

Devote more resources to systematic policy research to understand and influence decision-making processes, and devise new ways to harmonize different horizons of economic, environmental, regulatory and political.

Continue to forge appropriate policy and institutional frameworks to stimulate international cooperation in technology transfer and financial assistance for conservation and sustainable development of forests.
To formulate criteria for sustainable forest development that promotes international trade in forest products from sustainably managed forests.

Make vastly known, the commitments, policies and programs undertaken by different stakeholders in the forestry sector to achieve sustainable development objectives.

With regard to tropical areas, they constitute the largest reservoir of terrestrial biodiversity.

Without a doubt, for the areas are declining at a global level remain, you must use the vast majority of its timber resources, non-timber and wildlife.

The use of diverse resources can only be done under a sustainable management plan, for which knowledge is required, incentives, first rate technical supervision, appropriate controls and design of a series of parameters that allows us to measure whether the development and use of resources are within sustainable development.

For FAO, the only way to preserve the resource base of the forests is to make an arrangement of the same, implement technological changes that are suited not only to the conditions of each country, but to the local forest in question and finally, make certain modifications in the institutions that are in charge.

There is much debate about whether we have the biological knowledge necessary to exploit tropical forests. The answer is NO first hand, if we refer to studies of life cycles and population dynamics of this great diversity of species, but if we refer to the information necessary for sustainable management of forests, the answer is Yes. There are three recent studies that illustrate the operations necessary to maintain a good level of sustainability (Marn and Jonkers, 1982; Hendrison, 1989 and Schmitt, 1989). The five critical elements for achieving sustainable management of forests are:

1. Exploitation planning (management plan)
2. Forest roads.
3. Logging operations.
4. Drag and extraction.
5. Post-operation assessments.
Case 1
Criteria for the more sustainable agricultural development
By: Silvia del Amo Rodríguez

The criteria mentioned below are for research and education:

Make comparative studies of different systems. At present, there is a tradition of hundreds of years regarding the technology package of traditional agriculture of high impact, economical agriculture. Now, we must offer the same farmers sustainable alternatives, it is not possible for them to adopt them if they do not know. Previously there were even entire regions of rural producers who managed sustainable strategies, to which (due to misconceptions) they were forced to change to highly productive westernized practices. The intention was to help, but it didn’t happen that way. In some cases it will be necessary to return to old practices, with the support of current technology, not trying to completely replace their production systems, but to help them make better, what they used to do before.

Involving farmers in the development of agro-ecosystems. In many cases, farmers have the support of valuable years of experience, and we must work with them to find ways to improve their existing practices.

Develop specialized equipment for a different type of agriculture. The current farm machinery is designed for uniformity, for example, to harvest corn, the machines are the same height on all floors. But this is a result of excessive genetic uniformity of the crop. If, as we are proposing to increase diversity is achieved, the corn will not be the same height, which makes necessary the design of equipment that meets the Biodiversity Strategy and create a market for it. Companies must develop the equipment and make the change gradually.

Study the traditional crop varieties. There are many alternative agricultural products and traditional crop varieties rarely used, which have been falling into oblivion by the homogenization of consumption patterns. Today, almost all people are subject to the same pressures of marketing, of the supply of the same products. It would be desirable to return to a better use of the ecosystem, ensuring diversity in our food too. To achieve this goal, it would be ideal to redeem at least part of the valuable knowledge that several ethnic groups in our country have developed in terms of species that are usable by man. Cultures such as that of the Seri, that even when living in seemingly inhospitable environment, have taken advantage of the enormous amount of resources that nature offers them or, in very different environments, the Tarahumara and the Maya, who have found how to exploit its resources without jeopardizing the future availability of the same.
Include ecologists in the development of agricultural systems. Previously, only agronomists were involved, then, agronomists and economists, and now the participation of ecologists is required. Agronomists should have environmental education. The ecology has been given a more protectionist than development sense, thus the efforts haven’t been combined. For the understanding of how the environment (ecology) functions to bear fruit, it is necessary to disclose the potential economic benefits of its practical application.

Design the agro-ecological curricula. It is a high priority for the universities to offer courses in sustainable agriculture, crop diversification practices, and others that allow graduates to have the skills necessary to implement such Systems.

We must consider sustainability at the level of whole regions, countries and much desirably, the entire globe.

**Case 2**

*The conflict between Nuevo León and Tamaulipas over the San Juan River water*

The conflict between Nuevo León and Tamaulipas over the San Juan River water brought to the forefront of national life, a problem that has been growing over the past half century: water as the limiting factor in economic and social development of our country. Water scarcity is and has been the common denominator of all cities in Mexico, both in quantity and quality. But the fields are also thirsty. We are a semi-arid country, but we've never wanted to accept that as the reality that should regulate our lives, both in the number of people who may inhabit the country and the laws that guide and limit the use of the scarce factor that is water.

Water is essential in animal and plant life, it is the basis of personal and community hygiene, it is also essential in most industrial processes and services, in short, to say that "water is life" is not a metaphor, it is the expression of an everyday occurrence. When water becomes scarce the price ghost arises, one thing is the cost and other price, in price different users compete for the water, instead of doing it with their fists, which would be a very uncomfortable act, aside from dangerous and reprehensible, they do it with money, an accepted form of fighting, but the result is the same, someone runs out of water.

It may be the case of the political struggle for water, it takes little time, sooner rather than later imposed the economic side, the water will go where more productive.
To avoid or at least lessen the conflicts and resentments caused by the economic struggle for water it becomes necessary to have a National Water Act that regulates the use of the vital liquid on the basis of social need and economic productivity. Specifically, we consider three main areas in water use: urban, industrial, and agricultural. The urban area is a priority for obvious reasons, the competition will be between industry and agriculture. Usually the industrial and urban use come together in time and space, the industry is in the city or near the city, they complement each other and together have more weight compared to agriculture.

Historically, water has always been first used in agriculture and later in the city and industry. In Mexico, the federal government in 1925 founded the National Irrigation Commission, with the clear and straightforward objective to use water in agriculture. But the Mexico of 1925 had 15 million inhabitants and most of them lived in the countryside, 70 years later, the population is city-like and its economic activity enables it to pay for the water at such a high price that it makes agriculture uncompetitive.

We face a difficult problem in every direction, affecting our quality of life (quality of water we use) and the cost of daily living, it is expected that the price of any product will increase, especially the price of food and other agricultural products. If water is expensive everything is expensive because everything revolves around water.

The conflict between Nuevo León and Tamaulipas will affect the lives of both states for years, until the federal government intervenes to settle the dispute. The result is clear, the water will be for Monterrey and its metropolitan area because their greater financial capacity enables them to pay a higher price.

The problem is the conflict, and resentment. If we use our head (good reasons) and heart (good feelings) a little bit more than our throat (much shouting offensive) and our pockets (economic arrogance), the problem may be a satisfactory solution for everyone, because the water will be used to obtain more economical production by way of industry, and it would benefit the entire region.
Case 3
The socio-ecological cost of irrigation policy in Mexico

By Gabino de Alba Flores

To say that the irrigation policy in Mexico has a socio-ecological cost may seem to be a need, but I think there is a cost and that cost is evident.

The ecological cost is paid by all species that are affected by their ecosystem because water is diverted to the fields or because by constructing the dam (curtain), water invades their territory. Please note that rivers with their drag fertilize sea water, which is what phytoplankton lives off of, which in turn is the basis of all their food chain and the production of that fertilized sea area. Simultaneously, the river water lowers the salinity of sea water in the area where the river discharges, this alteration in the salinity of water is necessary in order to complete the reproductive cycle of some species.

Irrigation policy in Mexico impoverished fishing areas, and this has an environmental and social cost, to which no one ever makes reference to, due to the great ignorance that exists in our country with regards to environmental issues. The relationship that exists between the river, the sea, and the fisheries production is completely ignored. Socio-ecological cost rises when it is noted that the drainage water from the irrigation district is contaminated with pesticides and parasticides that when they reach the sea will cause great damage to the entire marine biota of the affected area. The damage to the marine ecosystem is twofold: it is impoverished and poisoned.

Irrigation policy in Mexico began in 1925, and in this 70-year period 5 million out of the 20 million hectares of arable land which are in Mexico were irrigated, and 200 million from the surface of the country, in other words made up more for less, less land and less water; less water because water that is stored in the dam is less than 10 percent of rain water in the basin of training, 90 percent or more of the water remained on the ground without paying more attention, without proper management, this water is lost by evaporation. Less land because 75 percent of non-arable land doesn’t have irrigation, and less land of all types (forests, grasslands, steppes) because irrigated land is less than 3 percent (2.5 percent) of the total.

Another problem is the quality of irrigation water, either in reservoirs or aquifers, with very, very often, that water has salts that make it unsuitable for irrigation because it causes soil salinity in irrigated, some districts Irrigation and have this problem, retrieve the soil and water is expensive in money, who's going to pay that
expense?. A very serious problem that does not want to recognize is that the policy of irrigation caused the abandonment of rainfed agriculture, economic, all the money goes to irrigation, technical, do not do research, or teaching, or extension for rainfed areas.

Irrigation policy became poor, rainfed agriculture, which is the vast majority of domestic agriculture. Ironically, the wealth of Mexico is in the rainfed agriculture area as both water and people, has 97 percent of the land, 90 percent or more of water and 75 percent of farmers all that is required is that you pay attention.

Finally, another policy issue is the cost of irrigation water when it has to compete for the water industry and the city spends too much water agriculture and what it produces, for social reasons, have low prices, serve as an example maize crop per hectare which spends 5 000 m3 of water and the harvest does not exceed 8 000 pesos gross income, if all income is applied to water, would give 1.6 pesos per m3, which is illogical because the farmer incurs many other costs and expects to have profits, the industry and the changing city can afford 2, 3 or more pesos per m3 of water and make a profit.

Agriculture needs good water and free, the only one that meets these characteristics is the rain water, therefore, more functional agriculture and further into Mexico is rainfed agriculture. For 70 years we have paid a high socio-cost irrigation for agriculture that is not functional, is not competitive and has no future, therefore, directed our efforts towards rainfed agriculture.

Summary

The term development means primarily an increase in the amount of goods and services produced by a company, it may be as small as a family business or as large as an industrial company, a city, an agricultural area, state, country or the world. Also expressed as the increase of something or someone, for example, a person's development from child to adult or a development of a city. In short, development is a transition, a journey, a move towards a goal, towards a goal, but development cannot and should not be something permanent, something endless, because if there is no goal, no direction and no direction on transit transformed into confusion, not knowing where to go or what to do. Economic development, which considers only the money factor is not what is referred to in this chapter, but a development that focuses on human and ecosystem and taking economics in the broad sense, taking into account commodities that give quality to life, like water, air, sustenance, clothing and home. In nature, the development has very clear objectives: at the individual level the aim is to sexual maturity and reproduction at the species level the goal is to adapt and build, occupy and defend a niche, at the
ecosystem level the goal is to reach climax that the state in which the ecosystem optimizes the use of the resources of climate, soil and topography, and sustains itself. The development will have as its goal a culture living in harmony inside and out. The intern is the social and this corresponds to the ethological dimension, and extends to the external nature in the broadest sense: air, water, soil, plants, animals, etc., which corresponds to ecological dimension. Therefore, we must emphasize that objective will be achieved only sustainable if it is in harmony with nature. As part of the ecosystem, man is subject to environmental laws that govern all animal and plant species in terms of processing and material and energy consumption.

Human development inherited and expanded on over two and half million years to the beginning of agriculture was sustainable because the culture of the stone could not break the laws of the ecosystem and diseases kept under control predators population growth. However, the sum of several technologies break this dependency: The bow and arrow allowed to dominate distance to any animal, agriculture and livestock are bound to increase food production, human population increased at the expense of other species in the ecosystem, technology of metals and ceramics demanded huge amounts of wood, same could be obtained thanks to the axes of iron, and the forest was the victim of this impact. The domestication of animals increased productivity in all directions, and the trade developed the economic balance of human society. The balance or harmony was from individual to individual within the community and from group to group among communities, but this meant the defeat of the losses to the ecosystem. Humanity did not think or think about the environment that sustains it, take it for a fact, in many cases he sees as his enemy and it must defend itself from disease, cold, heat, wind. This is overcome nature; man is the owner and master of nature. In sum, the conflict between development and sustainability lies in the ignorance of the ecology, and the arrogant attitude of man against the ecosystem. Ecological wisdom and commitment to the ecosystem are the basis for sustainable development, not only for the current generation but for all the generations of tomorrow.

In short, the vision offered by the sustainable development is based on four assumptions:

1. Earth's resources are limited
2. The redesign of human’s processes of transformation
3. The cyclic generation of waste at a rate that Earth can absorb
4. A new paradigm of civilization, including:
Balance between ecological, economic and social resources or living in harmony with nature or individual and collective responsibility in front of the Earth or efficient use of natural resources

**Second Topic: demographic aspects of the municipalities of Aguascalientes**

**Introduction**

This paragraph is based on the document "Socio Demographic Indicators of Selected Municipalities of Aguascalientes, 2000-2007" which contains coverage of 116 indicators on population, health, education, occupation and employment, territorial distribution of the population, housing and social marginalization.

1.1. **Structure and population dynamics**

In the five years running from 2000 to 2005 the state's population increased by about 121,000 inhabitants, 12.8%. The resulting annual rate of 2.2% was more than twice the national average (1%) and was the fifth highest among states. This average, however, is not homogeneous within the municipalities of the state. The greatest increase in the capital city had (Aguascalientes) and three neighboring municipalities with it. San Francisco de los Romo had a 44% relative increase in number, Jesús María followed with a 28.9% and Pabellón de Arteaga reached 13.5%. Other municipalities increased by 12.8% below even the municipality of Calvillo had negative growth.

The gender composition of the population of Aguascalientes has a female predominance of 51.6% over 48.4% of the male population. The sex ratio (male-female ratio) indicates that for every hundred men 93.7 women residing in the state. Nine of the eleven municipalities have a very similar behavior, however San José de Gracia only reaches a rate of 89.3 men per hundred women and the municipality of El Llano gets a balanced composition of 99.9 men per hundred women. This female majority largely explained by the higher male mortality and emigration.

In connection with the distribution of population by age group in the same period 2000-2005, decreased absolute and relative share of children under 15 years and increased the population of working age (between 15 and 64) and older adults (65 and over). This behavior is observed among population in the 11 municipalities of the State, shows the progress of the transition towards an aging population by fertility decline, with the obvious reduction of infant and young and increased life expectancy and the net effect migration.

In Count II General Population and Housing, 33.7% of the Aguascalientes population were between 0 and 14 years old, 60% from 15 to 64 and 4.7% were seniors. In the municipalities the lowest number of children presented Aguascalientes (32.7%) and greater San Francisco de los Romo (39.2%). This is explained by some characteristics of the urban lifestyle of modernity (couples work, educational level, and planned nuclear family) and its effect on low fertility. Regarding the percentage of people of working age, the highest it has Aguascalientes and San José de Gracia the child.

The existence of jobs and opportunities, among other things, appears to directly affect the workforce attraction between a municipality and a better economic development of poor performance. The scarce availability of opportunities can also explain the population structure of the municipalities of Calvillo, Llano, Tepezala seats and a high participation of the elderly and children, and low participation of people of working age who tend to immigrate to America. On the contrary, but in the same tenor of the availability of opportunities, San Francisco de los Romo and Jesus Maria, show low rates of older and high minors, resulting from the expansion of the city of Aguascalientes and settlement young couples in these new developments in population with their new families.
1.2. Territorial distribution of population

The population distribution pattern shows the convergence of two opposite phenomena. The first is population concentration, such as the city of Aguascalientes, with 62.3% of the state population. The second phenomenon is shown by the fragmentation given in 1,535 villages with fewer than 100 inhabitants each in 2.3% residing in the state's population. Since the last century as a whole entity is urban, considering the parameter that considers the core city population of 2,500 people on, and countryside which has a smaller amount. In 2005, 81.1% of the population lived in urban areas and 18.9% in rural areas, however Seats, Cosio, El Llano and Tepezala are municipalities with a majority of rural population. Calvillo shows half and half, and Aguascalientes, Jesús María Pabellón de Arteaga, Rincon de Romos, San Francisco de los Romos and San José de Gracia are the predominant urban municipalities. This paradox given in the simultaneity of the merger and fragmentation in the spatial distribution of the population, this must be seen in context of one of the smallest states in Mexico. The size of the state, the high concentration of the capital city and county, allows high communication and transit of persons, goods and services, including construction of roads without major problems.

Urbanization and its association with better living conditions seen in the "marginalization Index of 2005" (performed by Conapo), from highest to lowest, the municipalities of Aguascalientes, Pabellon de Arteaga, Jesús María, San Francisco de los Romo and Rincón de Romos are the least marginalized, in contrast Asientos, El Llano and Tepezala, also in descending order, are the most marginalized and therefore present the lowest degree of urbanization.

The relative weight of local populations in the municipalities listed at first place is the city of Aguascalientes, with nearly 92% of the population from the municipality; however Asientos is at the opposite side with a concentration of 10.6% of the population in its higher area. Between each side, what is observed is that the concentration of population keeps an inverse relationship with a proportional index value of each municipality. The following list of municipalities matches term by term almost with the scale of concentration from highest to lowest and, simultaneously, from lowest to highest marginalization: Aguascalientes, Pabellon de Arteaga, Rincon de Romos, San José de Gracia, Jesús María, San Francisco of Romo, Calvillo, Cosio, El Llano, Tepezala and Asientos. The pattern of "concentration-dispersion "is linked to the existence of economic imbalances within the state territory.
1.3. Migration

In the last century Aguascalientes went through periods of net migration gain and loss, in function of the socioeconomic situation that has gone historically through the institution and the country. But for the past three decades the local economic dynamism has stabilized somewhat the socioeconomic status, which was reflected in a positive balance in trade with the rest of the country, in which one of every five inhabitants of the entity is a native of another state of the republic.

The municipality of the capital is made of one quarter of its population by residents from other states, which is the most attractive feature. Jesús María and Rincón de Romos with a 13.6 and 13.3% respectively, followed in this area of the municipality of the capital. At the lower end of the migratory attraction are located San José de Gracia (3.4%), Tepezala (5.6%) and El Llano (6.2%), with few people coming from other states. Again matches another process, the attraction of migration, with the socio-economic benefits of the entities.

According to the Count of Population and Housing 2005 II, 36,343 persons 5 years and older, emigrated to Aguascalientes (from 2000 to 2005), while 15,387 people from Aguascalientes migrated to other places, making a favorable balance of internal migration more than 20,000 people. Of these persons four out of every 5 were settled in the municipality of Aguascalientes. If you add that Jesus Maria attracted 8.7% of migrants and San Francisco de los Romo (3.2%), 92.3% of migrants settled in the suburbs of Aguascalientes.

In the data from the count you can find people, aged 5 years or more, during the period 2000-2005 came to reside in Aguascalientes, 4,940 people from the United States of America. This group of people are not part of the internal migration, most are settled in the municipality of Aguascalientes, but the main reason (or at least more recurrent) is located in the return to place of origin before seeking the American dream.

1.4. Social exclusion

The National Population Council (CONAPO) defines marginalization “as a structural phenomenon that originates in the manner, style or historical pattern of development ... (and shows) in ... a precarious structure of social opportunities for citizens, their families and communities, and exposes them to deprivation, social risks and vulnerabilities which often escape to the control of school, family and community and whose reversal requires the active involvement of public, private and social agents.”

Exclusion rates are created with four dimensions (education, housing, earned income and territorial distribution), for which new forms of exclusion were
established, which is associated with an indicator to measure their respective strength: percentage of illiterate population, percentage of population 15 years and older with incomplete primary/elementary education, percentage of households living in houses without water, draining, electricity and a dirt floor, percentage of employed population that receive up to two minimum wage salaries.

In 2005 Aguascalientes ranked fifth as a federal entity with less marginalization of the country, three municipalities of Aguascalientes have a very low level of marginalization (Aguascalientes, Pabellon de Arteaga and Jesus Maria), six have a low degree of marginalization (San Francisco de los Romo, Rincon de Romos, Calvillo, San Jose de Gracia, Cosio and Tepezala) and two had intermediate level of marginalization (El Llano and Asientos). The marginalization can be set according to the degree of influence of the capital city (city of Aguascalientes?). Access, and linkage of the city of Aguascalientes to the municipality in question can be read as the travel and the level of poverty ranking: suburbs, areas in the west, north and east.

Most state residents are located in towns with low and very low marginalization (95.2%), municipalities such as San Francisco de los Romo (99.1%), Aguascalientes (97.9%) and Pabellón de Arteaga (96.5%), highlighted for this aspect. The less fortunate municipalities are once again the northern and eastern (only better than Asientos), located outside the metropolitan concentration: Asientos (70.5%), El Llano (74.9) and Cosio (82.4%)

Municipalities do not appear to present a difficult scenario, but to focus the level of poverty in the municipalities, the situation changes, due in part to the paradox between the dispersion and concentration, which is coupled respectively with the low and high quality of life, respectively. The proportion of total localities in each town of three houses and more with high and very high degrees of marginalization is very revealing to its respect.

The state percentage of sites with three houses in a situation of high and very high marginalization is 27.0%, and it does not represent a proper correspondence with the degree of municipal marginalization discussed above. Aguascalientes and Jesus Maria have very low levels of marginalization, like municipalities, but paradoxically, both cities have high percentages of sites of 3 houses or more, who are at high or very high marginalization, Aguascalientes has a 31.8% and Jesus Maria has a 27.4 % on the same line, both are above the state percentage of 27.0%. Again the concentration of the hidden population has no balance within municipal territories. Only the municipality of San Jose de Gracia (47.1%) overcomes in this line to 31.8% from Aguascalientes, then follow Asientos (29.4%), Jesus Maria (27.4%), El Llano (26.7%), Rincon de Romos (25.8%), Cosio (25.0%), Pabellon de
Arteaga (25.0%), Calvillo (20.5%), San Fco de los Romo (16.7%) and Tepezala (11.4%).

2. Demography and economical growth

Aguascalientes is currently in 27th place by the size of its population between national states with 1 million 124 thousand inhabitants and an annual growth rate of 1.9%. The population dynamics is that according to a recent survey by Mitofski Consultation - "The best urban areas of Mexico" - Aguascalientes proved to be together with Guadalajara and Veracruz as one of the three urban areas of the country with the highest preferences of Mexicans to live (2nd place), work (4th), study (6th), vacations (7th), have fun and relax (8th).

From 1980 to 2007 Aguascalientes increased the population density from 98 to 198 people per square kilometer, while in the same period the country had an increase of 52, and neighboring states such as Durango and Zacatecas reached 12 and 19 increases, respectively. Only the Federal District (6,106), the State of Mexico (609), Morelos (330) and Tlaxcala (250) topped with increases in population density per square kilometer to Aguascalientes in the mentioned period.

Colima and Aguascalientes are the entities that have the highest proportion of urban population in the Central West, nine out of ten of its inhabitants live in urban areas. Both entities are surpassed by the Federal District and its nearly 100% of population in urban areas, Nuevo León (94.8%), Coahuila (93.1%), Baja California (93.1%), Morelos (91.3%) and the State of Mexico (90.2%). Chiapas with 47.9% of its population in urban areas and 46.4% Oaxaca are the states with the lowest percentage of urban population, quite distant from Aguascalientes and Colima.

In the final decade of last century and the first half of this, Aguascalientes was the state with the highest real growth rate of GDP per capita of the country, almost doubling the 2.8% national. Gross domestic product grew at 5.4% annually while the population grew by 3.35%. Aguascalientes reached the fifth position in the national population growth rate surpassed only by Quintana Roo, Baja California and Queretaro. The national population growth of 2.38% was similar to the economic growth of 2.8%; Aguascalientes’ economic growth was greater than the population, transforming so the economic growth.

In Aguascalientes, the GDP per capita grew from 13.833 to 19.909 pesos per inhabitant from 1993 to 2004 at constant prices. In this decade grew more than 45 000 workers enrolled in the IMSS. Only entities of the Federal District, Nuevo Leon, Campeche, Coahuila, Quintana Roo and Chihuahua, in similar conditions, exceeded Aguascalientes with a GDP per capita over 30 thousand pesos, a situation in which the Federal District stood out with 37,215.
For the fourth quarter of 2007, according to the National Survey of Employment and Occupation of the INEGI, Aguascalientes’ employed population reached 434 000 people, surpassing the previous quarter with 10 000. Moreover, from the first quarter of 2005 and fourth in 2007 there is a difference of 50 000 more people with employment.

The non economically active population includes persons not participating in economic activity, as employed or as unemployed, for the fourth quarter of 2007 nearly 322 000 people, 41.3% of the total population aged 14 and over from the State was part of this group. Of this population, 80.6% stated they were not available for work because they take other obligations or that despite their interest in working they have disabilities to do so (physical, family, or others). 19.4% declaring available but not performing any action for the case.

Among the employed, while 4.6% work less than 15 hours per week, at the other end 33.8% work more than 48 hours per week. As an average the population works 44.4 hours per week. In relation to the economic unit in which they work, 84.8% of the employed population works for the non-agricultural area, 47.0% of this, a little over 173 thousand people are engaged in micro business, just over 73 000 (19.9 %) in small establishments, about 33 thousand (8.9%) in medium, just over 46 000 (12.6%) in large facilities, almost 30 000 (8.1%) in government activities and about 13 thousand (3.5%) in other types of economic entities.

GDP per capita in Aguascalientes remains higher than the country. Unlike the national total, the greatest resources in Aguascalientes come from the manufacturing industry, followed by the services and finally located in the trade or commerce. This is in reverse of the trend for the country. From 2000 to date the insured workers in the IMSS have grown at a rate of 2% canceled nationwide, while in Aguascalientes it reaches 2.5%, as it has offset job losses in the
transformation industry, with increased employment (and membership) in the service sector and trade or commerce.

2.1. The environment

In Aguascalientes, the coverage for drinkable water is 99.2% in urban areas and 92.0% in rural areas. In 2007, there were 14 wildfires in the state that affected 310 hectares. The most affected municipalities were Aguascalientes (162 has.) and Jesús Maria (50 has.)

In December 2009, the state had three protected natural areas, two federal controlled for the protection of natural resources and one state controlled, dedicated to the care and ecological conservation.

State generation of municipal solid waste was 309 thousand tons in 2007, the main generators were the municipalities of Aguascalientes and Jesús María Calvillo, in that order.

In the United Nations World Conference on Human Environment (Stockholm, Sweden, June 5 to 16, 1972), was set June 5 as World Environment Day to make clear the need of the governments and people around the globe to be aware and carry out joint actions to confront and redirect the causes that are deteriorating and depleting natural resources and environment in many regions of the planet.

The global and national commitments are renewed in global forums, as has happened with the Cumbre de la Tierra (Rio de Janeiro, 1992): La Cumbre Mundial sobre Desarrollo Sustentable (Johannesburg, 2002), La Cumbre del Milenio (New York, 2000) as well as in the protocols, conferences, diary, binding or not, on specific topics such as atmosphere, biodiversity, climate change, desertification, women and habitat, among others.

Therefore, each year on 5 June, the United Nations and countries commemorate that date to encourage greater awareness and participation for the environment, promoting policies and strategies at global, regional, national and local levels aimed at a sustainable relationship of the human species to natural resources (soils, water, air, vegetation and living beings and living species in these ecosystems) to ensure the survival of the species.

The World Environment Day, in each country is celebrated in different ways, since global conferences and government actions to popular cultural celebrations, social
and political. Every day, demands of society to adopt policies, strategies and actions to make more effective commitments of environmental protection are increasing.

In a world of continuing globalization, population - besides the increasing rates still high in several regions of the world- record an increasing stream of mobility and migration, in an expansive process of urbanization, land use and its green areas, in the same manner, deteriorating natural resources and increasing demands.

The global pace of development and technological transformations excludes from progress the most vulnerable sectors of the population pushing to poverty to millions of people. Another critical feature of this development is mainly based on consumption patterns of fossil fuel intensive and consequences almost irreversible for global stability, according to recent scientific reports, to continue the current pace of global warming, caused mainly by the human activity, by 2050 could be extinct until 30 percent of animals and plants species, drought and melting will leave without fresh water to more than 1 000 million, while other regions will suffer extreme weather and flooding, and other natural disasters and wars over resources.

**Third Topic: Natural Resources and Environment of Aguascalientes**

Below is presented a selection of statistics and indicators on natural resources and environment of Aguascalientes, from its own sources and external, in order to provide users an overview of the state.

**TERRITORIAL SURFACE**

Mexico is conformed of 1,964,375 km² of land area. For its part, Aguascalientes represents 0.3% of the total area of the country and has 5 618 km², that makes it the fourth smallest state. Beat the states of Morelos (4893 km²), Tlaxcala (3991 km²) and the Federal District (1485 km²).

Municipalities in the state with the largest area in relation to the state are: Aguascalientes (21.0%), followed by Calvillo (16.6%) and San José de Gracia (15.4%), in contrast, Cosio (2.3%), San Francisco the Romo (2.5%) and Pabellón de Arteaga (3.6%) has the lowest proportions.
WEATHER

The behavior of precipitation and temperature, in terms of its characteristics over time, and other elements such as evaporation and humidity, among others, are the basis for the classification of different types and subtypes climate prevailing in Aguascalientes.

The weather of the state is characterized mainly by the subtype semi temperate BS1K which predominates in 71.0% in the territory remains heat strengthened BS1h subtype, with 15.4% and a lower surface, the temperate sub-humid with summer rains C (w) with 13.6%, the annual average of temperature range is 12 to 22 °C and an annual average of rainfall of 400 to 600 mm.

SOIL

Soil is a natural resource that corresponds to the upper layer of the earth's crust; contains water and nutrients that living beings. Soil is vital for human beings, because they survival depend on this for food production, animal husbandry, planting, getting water and mineral resources, among other things. Soil supports and nurture plants in their growth and condition, therefore, the whole ecosystem development.

In Aguascalientes, there are 13 of the 30 soil units recognized by the World Reference Base (World Reference Base for Soil Resources) 2000, four are the most representative; they cover 79.7% of state’s territory.
Litosol soil groups (21.9%): Found in all climates and with very different types of vegetation in all of Mexico mountains, canyons, hills and some flat terrain. Natural fertility and susceptibility to erosion are highly variable.

Feozem soil groups (20.8%): Soils that may occur in any type of terrain and climate in tropical regions except rainy or very arid areas. Depth is highly variable. When they are deep, they are used for agricultural irrigation or temporary, grains, vegetables, with high yields. The shallowest can be used for grazing or farming with acceptable results.

Planosol soil groups (19.6%) Planosol, the term derives from the Latin word "lichen" plain meaning, referring to his presence on the flats, seasonally flooded. It is characterized by an overlying eluvial horizon that abruptly degrades dense soil.

Xerosol soil groups (17.4%): From the Greek Xeros, dry, these soils are located in arid and semi-natural vegetation is scrub of and grassland. It is characterized by a light-colored surface layer and very low in humus. Below it there may be a clay-rich subsoil, or in the surface layer.

WATER RESOURCES

Water has become a strategic resource for economic development and survival of the countries due to scarcity for human consumption and loss of original quality. According to the IV World Water Forum (Mexico, 2006) 1.1 billion people do not have access to safe drinking water and 2.4 billion have no sanitation. Even in
developed countries, wastewater discharges do not receive proper treatment, especially in large cities, threatening human health and ecosystems.

Comision Nacional del Agua (CNA) has defined 37 hydrological regions in the country administered by 13 regions. Aguascalientes is included in the VIII Lerma Santiago Pacific region. In 2008, 71.7% (448 Mill m³ / year) of water used in the state, was superficial and 28.3% (177 Mill m³ / year) from underground sources, 79.2% (495 Mill m³ / year) is used in agriculture, 19.0% (119 Mill, m³ / year) in public water supply and 1.8% (11 Mill m³ / year) in industrial use.

Percentage distribution by type of water use, 2008

![Percentage distribution by type of water use, 2008](image)

**WATER AND SANITATION**

Mexico adopted the "Millennium Development Goals during the UN Summit in 2000, pledging to reduce, by 2015, half the percentage of people who in 1990 had no drinking water.

In 2005, the state coverage in drinking water was 99.2% in urban areas and 92.0% in rural areas. Also, in terms of sewerage coverage, the percentage was 98.8% in the first and 88.4% in the second.

Regarding sanitation, La Cumbre de Johannesburgo adopted the goal of reducing by fifty percent by 2015, the percentage of people without service. In Aguascalientes, in 1990, 13.8% of the population had no sewer service (98,689 inhabitants), 2005, the percentage fell to 2.5 percent.
WATER PURIFICATION AND TREATMENT

According to the Statistical Yearbook of Aguascalientes in 2007, there are 255 water treatment plants operating in the state with an installed capacity of 4,262.3 liters per second (lps) and treated mts³ 96.1 million of wastewater.

Of the total wastewater collected by the treatment plants, 99.7% received secondary treatment, which consists of removing colloidal and dissolved organic materials, 0.3% primary treatment pH adjustment and removal of organic and inorganic materials in suspension, with equal or greater size to 0.1 mm.

WATER POLLUTION

In Aguascalientes, the proportion of treated wastewater is significant, however, a significant amount of contaminated water still poured into the ground, lakes or ponds without treatment.

In 2007, the CNA in the state had a monitoring network consisting of 11 sites, where they checked the two parameters for assessing water quality, such as Biochemical Oxygen Demand (BOD5), Chemical Oxygen Demand (COD) and Total Suspended Solids (TSS).

FIRE

CONAFOR reported 14 fires for the state in the year 2008, which affected 310 hectares. Some municipalities were damaged, such as: Aguascalientes (162 has.) Jesús María (50 ha.) Pabellón de Arteaga (38 has.), Rincon de Romos (31 has.), San José de Gracia (17 has.) And Tepezala (12 has.).
Affected areas as a result of forest fires per municipality in 2008 (hectares)


During the period from 1991 to 2009, there have been reported 218 forest fires. In 1992 there was the lowest number of forest fires (just 2) unlike in 2005 when there were 28. As a way to counteract the damage caused by these forest fires, there have been implemented reforestation programs in the most affected areas at all three levels of government. In 2008, about 4.3 million trees were planted and 5,022 hectares were reforested.

The most notorious places reforested were Asientos (1,405,750 ha2), Pabellón de Arteaga (614,650 ha2), San José de Gracia (547,000) and San Francisco de los Romo (538,000 ha2).

Planted trees and reforested surfaces per municipality (2008)

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Planted Trees</th>
<th>Reforested Surfaces (hectares)</th>
<th>Surfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>The whole state of Ags.</td>
<td>4,285,830</td>
<td>5,022</td>
<td></td>
</tr>
<tr>
<td>Aguascalientes</td>
<td>335,505</td>
<td>654</td>
<td></td>
</tr>
<tr>
<td>Asientos</td>
<td>1,405,750</td>
<td>1464</td>
<td></td>
</tr>
<tr>
<td>Calvillo</td>
<td>137,612</td>
<td>248</td>
<td></td>
</tr>
<tr>
<td>Cosio</td>
<td>22,000</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Population</td>
<td>Code</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>El Llano</td>
<td>259,320</td>
<td>302</td>
<td></td>
</tr>
<tr>
<td>Jesús María</td>
<td>111,493</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Pabellón de Arteaga</td>
<td>614,650</td>
<td>655</td>
<td></td>
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<tr>
<td>Rincón de Romos</td>
<td>259,500</td>
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<tr>
<td>San Francisco de los Romo</td>
<td>538,000</td>
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</tr>
<tr>
<td>San José de Gracia</td>
<td>547,000</td>
<td>567</td>
<td></td>
</tr>
<tr>
<td>Tepezalá</td>
<td>55,000</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>


**FAUNA**

The fauna consists of all natural species that inhabit naturally every place on earth. Species are closely related with the rest of the living (vegetation, microorganisms) and non-living (sun, climate, water, etc.) parts of the environment. All these things together form an ecosystem. Many animals can move and adapt. Therefore, there are migratory species such as both...

In Aguascalientes all wildlife is in the mountainous region because it is sparsely populated, with fewer crops and vegetation. In the mountains inhabit animals such as puma, deer, boar, bobcat and squirrel. In the valleys: coyote, gray fox, raccoon, rabbit, quail, owl and eagles. It is also possible to see animals such as lizards, serpents, salamanders, ducks and bats.

**Natural Protected Areas**

In December 2007 the state had two protected areas under federal control known as Protection of Natural Resources; a state control that designated those areas to be under observation. These areas are important for the diversity of fauna and vegetation species that inhabit there as well as conservation and protection of forest resources.
### Protected areas of federal control, 2007

<table>
<thead>
<tr>
<th>Date of Decree</th>
<th>Denomination</th>
<th>Natural Protected Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-VI-1949</td>
<td>Feeder basin of the National Irrigation District 001 Pabellón</td>
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<tr>
<td>8-VI-1949</td>
<td>Feeder basin of the National Irrigation District 043 State of Nayarit about the sub-basin of the Juchipila river</td>
<td>1</td>
</tr>
</tbody>
</table>

### Protected Areas under Federal Control (2007)

<table>
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<th>Denomination</th>
<th>Natural Protected Areas</th>
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<tbody>
<tr>
<td>30-I-1994</td>
<td>Zone subject for ecological conservation</td>
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</tr>
<tr>
<td></td>
<td>Sierra Fría</td>
<td>1</td>
</tr>
</tbody>
</table>

Conclusion

According to the scenario presented in this part of the document, in Aguascalientes there are a number of social, economical and political problems as well as migration. And the effects they have on communities are issues we must solve with the help of both political and administrative actions. Moreover, the tendency to reduce the opportunities for migration is a matter that requires strategies to ensure that the resources from the migration are enough to help the communities’ development and also to take care about the necessity to provide alternative employment for those people who do not have chance to migrate.

Aspects clearly predominant as the limited supply of quality jobs and the enormous problems that affect people’s social life are still being debated. It is very noticeable that a major problem is the quality of jobs that are making.

In general you can see the necessity to solve urgent problems in our state.

Sources:

INEGI. XI General Census of Population and Housing, (Mexico, 1990)
QUESTIONNAIRE

1. - Agricultural practices transform the ecosystem, but both food production and conservation are desirable goals; in your opinion, what is the difference between them and traditional agriculture? Give an example of sustainable agriculture.

2. - What does the term "sustainable agriculture" mean? What is the difference between this and traditional agriculture? Give an example of sustainable agriculture.

3. - What are the considered ecological principles for the development of agro? Briefly discuss each one of them.

4. - What are the constraints that the fundamental principle of sustainable development faces?

5. - How can the forests react to an alteration, and how this influences the sustainable development plans?

6. - What are the five critical elements for achieving sustainable management of forests?

7. - How do you evaluate sustainable development projects? Who should do it?

8. - What is the importance of engaging in sustainable development planning to local indigenous groups in a given area?

9. - Mention two examples of strategies to achieve sustainability.

10.- Discusses the socio-ecological consequences that the policy of irrigation causes in ecosystems and in rural areas.