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## Food Security: Sustainability Problems Plaguing Cyprus

Cyprus: the allure of Aphrodite, the talent of the sculptor Pygmalion, and the exotic features of this Greek-speaking land all attract thousands of visitors to this beautiful island in the Mediterranean. The service industry is thriving and accounts for 76% of the Gross Domestic Product (GDP) in the Republic of Cyprus (CIA factbook). However, the agriculture on Cyprus has suffered a blow. In 1960, 40.3% of the working citizens farmed for a living; only 28 years later, the percentage dropped to 13.9% (country studies).

Agricultural problems are inherent in island nations and are unfortunately exacerbated by environmental issues like drought and societal issues such as urbanization. It is not only vital for an island to place importance on food security for the entire island's well-being, but also for the many individuals who rely on subsistence farms. These individuals would be helpless if a serious disaster threatened their livelihoods, and this is why it is up to sustainability research to ensure the continuance of subsistence farms in Cyprus. First, the most pressing issues must be discussed with possible solutions, as well as the current situation of subsistence farms.

Water scarcity is the major issue facing the subsistent farms of Cyprus. Generally, Cyprus is a dry country with a low annual rainfall. But recently, water pollution and droughts have plagued the country. Because of their sizes and low income, subsistence farms cannot obtain water as easily as the more commercial farming operation in Cyprus. Initiatives have been made both for members of the European Union and for Cyprus specifically to make food sustainability possible. These measures include education, monetary contributions, and alterations of agricultural practices to improve the environment. Since most of these measures are fairly recent, it is hard to predict the future of agriculture in Cyprus, much less the future of subsistence farms. However, more help is currently needed for the subsistent farms of Cyprus. Much of the population still relies on the land, but it is difficult for them when water scarcity is a recurring problem.

Subsistence is "the barest means in terms of food, clothing, and shelter needed to sustain life" (Webster). Therefore, a subsistent farm will be defined as a farm on which a family makes its own food, selling excess crops for other necessary means of survival such as shelter and clothes. Even though much of the population is employed in the service industry, 7.4% of people in the Republic of Cyprus and 14.5% of people in Northern Cyprus still make their livings in agriculture (CIA factbook), some of these farmers being subsistent.

Family size in Cyprus is decreasing in both rural and urban areas and has been for the past 50 years. Reasons include more women in the workforce, a booming economy, and a philosophy of providing better futures for offspring (country studies). A more remarkable change through the years occurs with urban and rural families. Now there is not a definite line between the two, as there once was. They have merged together both geographically and idealistically. For example, with more people on a small island experiencing urbanization, countrysides are no longer as frequent. In the idealistic sense, contraceptives are easily available and used, as well as abortion accepted. As a result, family size is only marginally higher in rural areas as opposed to urban areas: An average family of 3-4 people for either (country studies). Considering this would include single people and elderly couples living alone, as well as the fact that subsistent

farms are going to be more remote and family values more concrete, an average family living on a subsistent farm would be around five people. This is certainly conceivable. 17.8% of the Cyprus families are at or over five people, 11.8% being exactly 5 people (Children's Welfare and Everyday Life in Cyprus).

Considering a subsistent farm feeds all the family working on it, a family's diet would consist of the common agricultural products of Cyprus. These agricultural products are vast and include all manners of foods; however, there is a general geographic trend for peoples living along the Mediterranean in which a typical diet consists of more fruits, vegetables, and cereals (Mediterranean Diet). These foods for Cyprus include crops such as wheat, barley, legumes, carrots, potatoes, tomatoes, almonds, apples, bananas, carobs, grapes, grapefruit, lemons, melons, olives, oranges, and peaches (country studies). Smaller amounts of fish and meat would also be common.

The farms in Cyprus are spread out and cover, in total, 14.5% of the land (EC country report). The average size of a subsistent farm is 0.25 to 10 acres per person (Labor Law Talk). And the average size of a farm in general in Cyprus is 3.6 ha or approximately 8.89 acres (EC country report). Therefore, for a family of five, an average of five acres for a subsistent farm seems reasonable.

Measuring a subsistent farm's income is difficult because its income is mostly the food the family lives off. A measure of income for subsistent farms is the total consumption, plus gross sales, minus gross purchases. Since the average subsistent farm family size in Cyprus is five people, the income would be the food intake of the family plus the cost of housing and clothes, minus expenses of the farm. An average Cyprus Household has expenses of almost 11,000 Cyprus pounds per year. Deducting entertainment costs and other expenses (to be counted as farm expenses), leaves about seven thousand pounds income for the family (Paphosfinder). Converting to US dollars equals roughly \$15,500 for a typical family of five living on a subsistent farm in Cyprus.

Education in Cyprus has vastly improved in the last 60 years, but not everyone benefits equally. In 1946, the illiteracy rate was a shocking 41%. In 2001, it was a mere 3.2%. School attendance is compulsory until the age of fifteen, and "all students have free access to public schools until the completion of the second cycle of secondary education, at 18 years" (Children's Welfare); however, a positive correlation exists between failing in school and a low socio-economic status (Children's Welfare). Any manual labor would most likely fall into this category, but especially workers on a subsistent farm. This means an average subsistent farm would not put as much importance into schooling. Considering the literacy rate trend, the parents of an average subsistent farm would be illiterate or barely literate, while the children would be literate and with only a basic knowledge of math and other subjects taught in school.

The Cyprus government makes great efforts to ensure its citizens have the basic necessities for life, made possible via the "Public Assistant and Services" legislation that is reviewed annually to redefine a minimum standard of living to which all citizens are legally entitled. In other words, no homeless people in Cyprus will exist in the government's eyes (Poverty and Social Exclusion in Cyprus). Whether this is the reality of the situation is yet to be proved. Also, if anything environmentally shattering were to occur, the citizens would still be in trouble; however, the general necessities are theoretically provided, if needed, to any family living on a subsistent farm.

The situation for the average subsistent farm in Cyprus is worse than it was some years ago. The population is growing, making the cubic meters of water per person decrease. Rainfall is lessening and pollution occurring. While the situation for other classes of the Cyprus society seem to be improving – education is better and there are more jobs in the service industry – the subsistent farms are suffering a blow.

There are numerous factors in the environment causing subsistent farms in Cyprus shortages. The most severe problem is water pollution and water sources. While the Republic of Cyprus has recently revamped its environmental policy (over three hundred directives and legislations) to “harmonize” with the European Union, problems presently exist, and it is tricky to tell how these actions will affect the agriculture in the future, if at all (Ministry of Agriculture). Moreover, it will be difficult for the government to enforce these regulations on all the small farms around Cyprus. Not only because they are widespread, but also because of the aging farmers who are uneducated and not environmentally conscience. These are the only major barriers to improving food security.

Farming practices have been improving, thanks to efforts made by various organizations, such as the European Commission, who, so far, has provided the biggest initiative. In this, a “menu” was created with 22 measures to help the agriculture of Cyprus and other countries that are part of the European Union. From this, the countries picked the measures best suited for their individual countries. Measures include animal welfare, organic farming, food quality, and support for forestry (Rural Development in the EU). Another program is e-Forsee. While the European Commission offers money, among other things, e-Forsee focuses on education to produce a sustainable Cyprus (Markou). E-Forsee predicts marketing will become easier with increased quality in agriculture, as well, making it easier for all farmers to sell their wares.

Biodiversity is expected to increase in Cyprus because of the help provided by the European Commission; however, this is hard to tell. There is no way to accurately tell how the agriculture in Cyprus is changing until a few more years come by, in which a statistical trend might be seen. The difficulty in assessing the agriculture in Cyprus is mainly because of the fluctuation of rainfall and available water. In general, the rainfall of Cyprus is decreasing, which makes it even more difficult to tell if the initiatives are working (Meteorological Service). It can be assumed that Cyprus is at least better off than it would have been had no initiatives started.

Water pollution affects subsistent farms the greatest because the farms usually don’t have as much extra money or resources to obtain good, clean water. Without adequate water, the crops on which subsistent farms live have no chance. Also, even just drinking water is hard to come by, especially if farms are distanced from society. There have even been sicknesses within the US related to drinking water within the last 25 years, and it is possible Cyprus might have some water pollution problems that they don’t even realize they have (EPA).

Water resources are measured in million cubic meters (MCM) for a year in a country, and also in cubic meters per person per year in a country. Cyprus, as well as other countries, has tried to stop the downward trend in water per person per year in Cyprus, but with urbanization and population growths, it does not seem like it will be enough. Science News, a weekly news magazine, placed Cyprus on a list of “Have Nots” estimated to have less than the recommended 1,500 cubic meters of fresh water in 2030. There is also a trend of increased cereal imports for countries with a water deficit – obviously showing how water scarcity can affect farmers (Perkins).

Insufficient water for a steadily increasing population is a serious problem, but also adding to water deficiency is an increased demand brought by booming tourism. Cyprus is becoming increasingly popular as a tourism destination. If every non-citizen paid a set amount of money when they entered the country, this would go to the government's effort to increase water availability. Even if the fee were small - \$20 or so - it would still help the government. Also, simply educating the tourists on the water scarcity would most likely make them use water more sparingly, i.e. discouraging long showers or other actions that seriously deplete water.

The climate in Cyprus is already dry during the summer months, and sparse rain and reservoirs are the only ways to acquire water. There are no perennial rivers in Cyprus, and eighty percent of the rainfall comes during the winter months. Fifty percent of the land is arable (suited for plowing, etc.), but only a small percent is irrigated. There are a total of 500,000 hectares of arable land, and 36,000 hectares of irrigated land (Tsiourtis). Also, there has been sea water intrusion into the country's biggest aquifer (underground water source) as well as water pollution from sewage and industrial wastes (CIA factbook). It is hard to know how subsistent farms fare when the country faces problems such as these. There is a project that started in 1993 called the Southern Conveyor Project that is supposed to guarantee farmers enough water by bringing excess water down from the north (country studies). However, water pollution seriously decreases the amount of water for the whole island. Projects like the Southern Conveyor Project have helped Cyprus' problems, but new problems keep arising.

Solving the water problem would not only satisfy the immediate needs of subsistent farm families, but also help the environment in multiple ways. First of all, increased water availability would mean less pollution, which is always good for the environment. Also, as soon as a family's immediate needs for water are met, it would be more willing to safeguard the environment by being careful with fertilizer and engaging in organic farming, as well as increasing biodiversity. Water is just the most immediate need. There are also issues like coastal degradation that can be helped with the aid of farmers. When Cyprus' water concerns are addressed, then it can help other nations become secure. Cyprus is even starting to donate now: it donated \$350,000 to the World Food Programme for impoverished Palestinians (WFP).

To solve the water concerns of Cyprus, as well as other nations, research needs to be done, and de-salination plants and increased reservoir capacity is needed. When the surface storage capacity increased from 1960 to 1990, so did the amount of irrigated land (Tsiourtis). The more capacity, the more rainwater can be stored during the winter months to use during the hot, dry summer months. More de-salination factories would also increase the fresh water available for Cyprus. These factories are particularly necessary because of the depletion of underground reservoirs and seawater intrusion. Research will make more efficient factories and safeguards against pollution. Also, improving agricultural practices decreases the amount of water needed for a number of crops. Any organization or government can help by sending monetary support or agricultural knowledge. The European Commission and e-forsee are examples of noteworthy help, which most likely have helped and will help in the future.

In order to solve food sustainability problems, cooperation must occur between nations as well as other organizations. Through collaboration, great advances can be made. Every nation and organization has a different viewpoint, and together the viewpoints can create a viable solution for all. If knowledge can be shared, so can success. Foreign exchange programs are excellent opportunities for this. Not only is information being shared, but in cases such as Cyprus, information can be brought back to aid directly. A student from Cyprus could travel to England to become an agricultural engineer and then bring back smart farming practices to his friends and family.

Environment concerns can no longer be ignored. Pollution in one country can affect pollution in another country. More organic farming needs to be implemented as well as many other environmentally kind practices, like taking care of sewage correctly. Action needs to start now. Water availability is a key factor, not only for Cyprus, but for other countries as well. The world population is growing, and with it, so is the need for clean water. Cyprus is not the only country predicted to drop below 1,500 cubic meters by 2030, and some 21 countries are already below that threshold (Perkins). Without water, food production is impossible. Fresh water is so vital in food security, yet it is becoming scarce when compared to the number of people on the earth.

If all these measures were made, a typical subsistent farm in Cyprus might obtain food and nutrition security. Subsistent farms are not represented well in the facts about the economy of Cyprus. Even though the economy is looking up for Cyprus, the outlook for subsistent farms is poor. Despite measures made by various organizations, water scarcity is an issue. The rainfall in Cyprus is decreasing while the population is increasing. Underground reservoirs are being depleted as well as intruded by salt water. Water pollution is occurring from sewage and industrial wastes. It is hard to know what effect the initiatives have had on Cyprus' agriculture. The only sure thing is that the current situation of Cyprus is anything but ideal in an agricultural sense. Farming practices are improving, but water is still scarce. For subsistent farmers, food security has not yet been obtained.

It proves challenging to determine the exact situation of subsistent farmers. More information is needed to make a better analysis, but the average farm would be a larger family with a greatly decreased salary when compared to the averages for Cyprus. The level of education would also be considerably less, which is a barrier to improving food security for subsistent farmers in Cyprus.

Education as well as general monetary support is needed to improve food security in Cyprus. The first step is to deal with water scarcity, and then other environmental concerns need to be addressed such as coastal degradation. Once water security is met, farmers will be more likely to help do their parts in the environment. If everyone can work together, food security may yet be obtained. The time to act is present. Most of the natural water reservoirs are almost gone or unusable. Something needs to be done, and it needs to be done now!

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