SOCIAL FORESTRY NETWORK

FOREST TREE NURSERIES IN AGRICULTURAL HIGH SCHOOLS: AN ANALYSIS OF ECUADOREAN EXPERIENCES

Dennis F Desmond

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Dennis F Desmond worked as a Peace Corps Forestry Adviser in Ecuador for five years. Initially he worked on the CARE Community Forestry Systems Project and then as Forestry Adviser to an agricultural high school.

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Introduction

The global proportion of tree planting compared to tree cutting is one to ten. For every ten hectares deforested, we are planting one hectare. However, the rate of deforestation in Ecuador is difficult to quantify, in most cases the data is not available, and the rate varies between the coast, highland, and Amazon regions. However, no one can deny that we have to increase the amount of tree-planting in the country, especially in the highlands.

Population growth is increasing the demand for forest products, especially wood. Small farmers walk further each day in search of fuelwood. Every day patches of native forest are eliminated in order to establish crops, pastures, and housing. The bare soils are being washed away by erosion, and are declining in fertility. The climatic and hydrological cycles are changing, affecting the production of food, potable water, and hydroelectric energy.

Governmental tree-planting programmes, operating with limited resources and depending on centralised nurseries, have not been able to resolve these problems satisfactorily. Besides the lack of tree seedling production, there is a need to institutionalise the plantation and protection of trees in existing social systems. In other words, there is a need to create a forestry tradition within the rural communities. In order to encourage local tree-planting initiatives it is important to train promoters and extensionists who live in rural areas and know local customs and practices.

Some Experiences

This paper is based on the author's experience with three agricultural high schools over a five year period in Loja, Canar, and Azuay provinces. The work in Saraguro formed part of a CARE Community Forestry Systems Project. The principal goal of the CARE project was the establishment of 700 hectares of forest plantations on the communal lands of the indigenous communities of the Loja zone, with seedlings from a school nursery. The current capacity of the nursery is 500,000+ seedlings.

The school nurseries supported by CARE were endowed with plenty of financial resources. However, the only goal of the nurseries was the production of seedlings for the communities that work with the Project. The integration of the Project with the high schools in order to teach tree-planting techniques to students was considered a goal of little importance and up until today such integration has been minimal.[1]
In the last case, the Nabon high school already had a nursery with a capacity of 40,000-50,000 seedlings. For all three nurseries the author tried to balance the goal of seedling production with the promotion of forestry education of students and teachers.

Assumed benefits and actual experience of school nurseries

The possible advantages of establishing and maintaining forest tree nurseries in agricultural high schools are numerous. Many of these advantages have been mentioned in other documents (Convenio MAG-MEC 1983, Benge 1987). However, there is a lack of documented experience for evaluating the validity of these theoretical advantages. In the following section the author describes his own experiences, in contrast to the benefits assumed in the literature for school nurseries.

It has been assumed that high school nurseries represent an intermediate step between centralised government nurseries and individual/community nurseries. Centralised nurseries are expensive to build and operate. Furthermore, transport of the seedlings is difficult and expensive, both for the producers and the buyers. Individual/community nurseries, although constituting the optimum method for the creation of a forestry tradition, at present lack the resources necessary to employ sufficient numbers of technicians and extensionists to ensure adequate nursery supervision in every community.

[1] The CARE Project at the time of writing is slowly withdrawing its involvement with the high school nurseries, in order to rely on individual / community nurseries.

From experience the author found that a nursery of intermediate size (say 20,000 to 100,000 seedlings) is a major and complicated responsibility. Good planning and administrative and technical management are needed to operate it. Without an adequate system of control and accounting, the per seedling production expenses can be enormous and the seedling quality low.

It has been assumed that because agricultural high schools are usually located in the centre of rural zones, their position will facilitate people's access to tree seedlings and alleviate transportation problems.

There are undeniable advantages for nurseries located within rural zones. Small farmers can transport small quantities of plants by foot, horse, or bus without major difficulties. However, for larger quantities of seedlings transportation is difficult. Due to the scale of production, the purchase of small trucks by the high schools is not justifiable. In several cases, the author has noted a lack of extension to the local farmers resulting in the production of seedlings that never leave the nursery.

The assumption that high schools will be receptive to the idea of having forest tree nurseries is partially proven by experience. As well as the nurseries acting as a living laboratory for student education, they benefit the whole area. In each of the three high schools, the rectors were receptive to the idea of a nursery, especially when help is given by other institutions. However, although the rectors are motivated, their daily participation cannot be expected in the operation of the nurseries due to their other responsibilities. Lamentably, the experience with teachers has been much less favourable than expected. Due to low salaries and the lack of other incentives, most of the teachers are not motivated to participate in high school nurseries. At the same time, most of them do not have training or experience in the operation of intermediate size nurseries.

In the case of high schools located in rural area, the majority of the teachers do not live in the zone. Instead, they travel weekly, sometimes daily, between the high school and the city. Moreover, during the summer vacation, when nurseries in the highlands are in the middle of seedling production, the teachers (especially the teacher in-charge) are not present.

Incentives do not exist for teachers to be at the high school outside of normal classroom hours. It has even been noted that peer pressure exists on the teachers-in-charge by their colleagues so that they do not work extra hours. Also, the constant change of teachers, year after year, leads to a lack of continuity in the various activities. This lack of motivation that predominates among the teachers diminishes the other possible advantages that high school nurseries offer.

It was assumed that the capital investment for establishing a high school nursery would not be high because the high school already possesses much of the infrastructure that is needed, including land, irrigation, tools, buildings, etc. "Free" labour provided by the students also reduces the cost of operation.

Although in reality it is true that the existing infrastructure reduces many of the costs of nursery establishment, operating costs are high. Although "free" student labour is a significant saving, a nursery of intermediate size needs at least one part-time nursery worker, depending on the production scale, in order to ensure its daily care. As pointed out before, if there are no trained and motivated teachers to plan, manage, and promote the nursery, a great majority of plants, of poor quality, will never leave the nursery.

It was assumed that both centralised nurseries and high school nurseries would be able to work with a wide variety of species, including species new to the zone, multiple use species, those difficult to propagate, or species whose seeds or vegetative material is expensive or hard to obtain. For example seed or vegetative material of genetically superior plants.

Although without doubt a high school can work with a wide variety of species, it should not be expected that the nursery follow a high level of technology. That is to say, propagative material that is difficult to obtain or propagate, or that is expensive would be better raised in centralised nurseries. Raising of these species in high school nurseries is a poor investment of time and money.

It was assumed that high school nurseries would benefit from the ability of the students to collect seed and vegetative material. This reduces the need to buy seed from outside sources. The students' detailed knowledge of the local vegetation can be used to identify those trees that may be useful to propagate.

Experience has shown that in order to guarantee an ample range of species in the nursery, students without a doubt have provided significant support through the collection of seed and vegetative material. However, sufficient training and control have not existed to ensure that the material collected is of proper maturity and from trees with good characteristics.

It was assumed that with the collaboration of the teachers and students, high school nurseries would serve as centres for investigation concerning propagation and production methods, especially of native species.

Experience has shown that investigations carried out by students in high school nurseries have been in general of poor quality and/or of little utility. Moreover, there has been no dissemination of the results. For

the students, the practical focus of the activity should not be in the results of the investigation, but rather in the learning of new scientific methods and, in the awakening of interest in forestry. It should not be expected that investigations in high school nurseries equal or replace investigations carried out in centralised nurseries.

It was assumed that there would be possibilities for inter-institutional coordination between high schools, local communities, governmental entities such as the Ministry of Agriculture and Livestock (MAG), and non-governmental organisations such as CARE among others.

Coordination between the high schools and other organisations has been carried out. However, due in part to the lack of motivation and training of the teachers, the high schools became dependent on these other institutions, be they governmental or private, for the provision of materials and management of the nurseries.

It was assumed that school nurseries would have a multi-purpose role within the local community; as well as producing seedlings for the zone, the high school nursery may serve as a practical tool for forestry or environmental education. Compared with adults, young people are more open to learning new ideas. Creating a forestry consciousness amongst young people will provide future benefits. These nurseries have an important role in institutionalising a forestry tradition in Ecuadorean society/culture. More than training future landowners, future technicians will also be trained.

However, since forestry is not part of the required coursework for the students, teachers lack the motivation and understanding to teach this subject. When the students do work in the nursery, in order to fulfil their hours of "agricultural practice", the teachers are not interested in teaching theory as a complement to the practical activity. The students, in most cases, become "slaves" providing free labour and nothing more.

It was assumed that establishment of forest tree nurseries may encourage other forestry activities by the high schools, including establishment of forest plantations, agroforestry systems, fruit tree orchards, and soil conservation practices. The high schools could become demonstration sites for students as well as adults of the zone.

High school nurseries have encouraged other initiatives, principally the plantation of trees on high school lands. However, the teachers lack training in techniques of establishment and management of forest plantations, agroforestry systems, fruit orchards, and soil conservation practices. It is difficult therefore for high schools to serve as adequate demonstration sites of the most appropriate techniques. These subjects need to be part of the student coursework.

It was assumed that high school students can serve as forestry promoters in the zone, since they take seedlings to their homes and thus encourage their parents, neighbours, and even the whole community to plant trees. As students know the local norms and customs and how to work within them they are more effective motivators than people from outside the community.

However, the author has not had any experience of the students acting as promoters in their communities, although the high schools have required the students to plant trees, normally on their parents' land. There has been no formal programme of forestry promotion by the high school towards the surrounding communities. Again, neither motivation nor resources exist so that the teachers or students assume this responsibility.

It was assumed that the sale of tree seedlings and the produce from trees planted at the high school (wood, Christmas trees, fruit, etc.) can be a source of income for the high school.

Although this assumption is appealing it is unusual today to find small farmers who are able to pay for seedlings at their actual price. In government nurseries, it has been necessary to subsidise the price of the seedlings or promote their plantation through other forms of incentive. This, along with the inefficient operation of the high school nurseries, makes it difficult for these nurseries to be profitable. However, over the long term, the products obtained from the trees planted on high school lands do constitute a source of income for the high schools.

Conclusions and Recommendations

In general, it is concluded that the majority of the benefits assumed for high school nurseries have not been realised in practice. Without the active participation of other organisations, seedlings of poor quality are produced that never leave the nursery. Moreover, the students learn little about forestry. This is due to two principal causes: a misunderstanding of the role of high school nurseries; and low levels of motivation and training of the teachers.

Therefore, three general recommendations are proposed:

- High targets for seedling production should not be set for school nurseries. High school nurseries should be small scale (say 5,000 to 20,000 seedlings). The principal focus of the high school nursery should not be the production of large numbers of seedlings in order to satisfy the needs of the entire

zone.

- Instead of high seedling production targets, the principal focus should be a programme of forestry education for the students, in which the high school nursery serves as a fundamental and practical component of the programme.

- In order to realise such a focus, it is necessary to design, implement, and evaluate an incentives package directed towards the teachers.

In continuation, some incentives are discussed that could be applied in order to effect this change:

It is important that forestry education becomes a priority of the Ministry of Education and Culture. Forestry education, by itself or as part of a broader programme of environmental education, has to become a required part of the coursework in agricultural high schools. Such programmes should focus on both the theory and practice of forestry. There already exist precedents for this type of action in other countries, such as in Paraguay and Peru.

Currently teachers are not trained in forestry. By instituting training courses for teachers they will gain the technical knowledge necessary for administering a forestry education programme; the teachers will also be motivated by being chosen to attend such courses and by the awareness that is developed as a result of the training. In order to maintain their motivation, this training should be repeated at regular intervals and include workshops, seminars and study tours.

Besides training courses, a source of reference information is needed. Excellent documents already exist concerning nursery techniques (Galloway and Borgo 1983, Valdivia 1986), forest plantations (Galloway 1986, Galloway 1987), and agroforestry and soil conservation (Carlson and Ronceros 1987). However, there is a lack of documents that describe curricula for forestry education and methodologies for teaching. These documents have to be made available to the teachers in charge of the programmes.

In order to motivate and train the students, there is a need to design, test, and evaluate quality teaching material and to train the teachers in how to use this material effectively. In addition monetary incentives should be provided to the teachers in charge of the programmes as compensation for their extra hours of work. Other bonuses could include subsidised housing, awards of money, diplomas and certificates, and public recognition for outstanding service in the programme. It is also important to look for ways to promote

the interest of the students and their parents. Their interest and participation can provide another incentive for motivating the teachers.

This is a partial list of the various incentives that can be applied. To ensure success, it is necessary to design a realistic "package" of incentives and monitor its application so that it can be modified when necessary.

In order to guarantee the design, implementation, and evaluation of the forestry education programme and the incentives package associated with it, the following actions are necessary:

- Creation of a special department within the Ministry of Education and Culture for administering the programme. This should include an interdisciplinary team of experts in administration, education, forestry, and audiovisual materials, as well as regional supervisors.

- A system of reporting and supervision for monitoring and evaluating the activities of the programme and the validity of the incentives.

- Regular meetings of teachers in-charge and supervisors in order to evaluate the effectiveness of the programme.

- Adequate financing. This, perhaps, constitutes the bottleneck of programme implementation

Some possible mechanisms for financing the programme are briefly mentioned (adapted from McNeely 1988):

- The first mechanism is an increase or redistribution of the regular national budget of the Ministry of Education and Culture. It was mentioned beforehand that high school nurseries are not profitable. Income generated from the sale of seedlings and tree products should be reinvested in nursery operations, in order to minimise dependence on external funds. With good promotion, it has been seen that nurseries can also produce vegetable seedlings for sale to the public.

- Links with larger development projects should be encouraged following the example of similar school nursery programmes in other countries. For example, the "School, Ecology, and Small Farmer Community" Project in Peru was born out of the Community Forestry Development Project financed by FAO/Holanda/INFOR.

- Taxes or sanctions on industries that are contaminating or in other ways degrading the environment could be used to finance school nursery programmes.

- Direct support from international development agencies, be they governmental or non-governmental. Worldwide, these agencies are considering the financing of projects that improve or protect the environment. However, if this support is not carefully targetted it could create dependency instead of self-sufficiency.

- Establishment of an independent foundation that generates funds for use in the school nursery programme. This foundation could be administered by a local environmental group such as Tierra Viva or Fundación Natura.

- On a smaller scale, coordination with other institutions could be continued at a regional or individual high school level.

Once a forestry education programme is established in the agricultural high schools, with a good incentives system for motivating the teachers, it will be possible to experiment anew with the concept of a high school nursery that has a co-principal goal of seedling production at an intermediate level. There is a need for this, especially in the highlands. Until then, seedling production in high school nurseries should be maintained as a secondary goal.

It is hoped that the experiences described in this paper will help to direct future school nursery programmes, and raise awareness of the problems of implementing programmes that do not have trained staff to support them. However, school nurseries are a vital extension tool both for the students and the local communities, and are a necessary part of education programmes. We have to sow the seed before we can harvest the fruit.

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