

**REPORT OF THE EXTERNAL EVALUATION OF  
VEGETABLES GO TO SCHOOL PROJECT**

**Commissioned by SDC**

**FINAL REPORT**

**January 12, 2016**

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Evaluation Period: October - December 2015**

## EXECUTIVE SUMMARY

The Vegetable Go to School (VGTS) project aims to improve nutrition in low-income rural communities by using school gardens as a lever to bring together food production, nutrition education and improved sanitation and health (WASH). It is an action research project that has strengthened national capacity and implemented school gardens in order to scientifically study their impact. The project has operated principally in four countries with significant problems of malnutrition (Bhutan, Burkina Faso, Indonesia and Nepal). At the country level it has introduced institutional innovation by bringing together agriculture, education and health ministries into a common effort.

### Research

Randomized control trials to measure the effects of school gardens on knowledge, attitudes and behavior have been undertaken in all countries. Data collection is on schedule and analysis of preliminary results from Nepal indicates a positive significant impact. Randomized control trials are the accepted state of the art method for impact assessment in international agricultural research and could yield compelling evidence to help convince national decision makers to institutionalize the VGTS strategy.

Case studies on the links between WASH and school gardens are being conducted in Burkina Faso and Nepal. Ambitious and thorough fieldwork is accumulating an impressive range of data ranging from socioeconomics to water quality and blood and fecal specimens. The biggest drawback of these studies is uncertainty whether the current approach of VGTS is the most effective path to impact. Further case studies would be useful on alternative impact pathways, for example, through linking school gardens to home or community gardens, school feeding programs, boarding schools, vocational agricultural education, public health outreach etc.

The Collaborative Research Environment (CRE) has developed internet based data warehouse and analytical tools for the project and related data sets. With this framework largely established in the first phase, in a second phase attention would be focused on promoting use of the CRE. It's greatest value could be as part of the effort to communicate to national decision makers about the potential of the VGTS strategy.

### Capacity Strengthening

Capacity building to train trainers and then to train teachers has been implemented and as intended has enabled the successful establishment of school gardens in all four countries. Training has correctly focused first on preparing teachers to garden and there is no evidence of dissatisfaction with the

training to date. However, more attention has to be devoted to nutrition, WASH, and using the gardens as teaching tools. Students absorb the fundamental lesson that vegetables are good, but their learning should be extended further.

In order to scale out the VGTS model large numbers of teachers and trainers will have to be prepared, and there will be a recurring need for training due to teacher turnover. Consequently, low cost approaches to training will have to be assessed in order to keep the effort feasible for national governments. Nepal is already thinking along these lines.

### Institutional Innovation

VGTS has been very successful in establishing operational country teams drawing on expertise from agriculture, nutrition and public health. Moreover, in all countries senior figures, especially in the ministry of agriculture, are conversant with and supportive of VGTS. By the end of the next phase of the project, in another three years, national policy makers will have to be prepared to initiate significant investment in the VGTS strategy since massive outscaling can not be financed by an external donor funded project.

To get to that point the next challenge for VGTS is to marshal compelling evidence to convince national policy makers to invest in school gardens. This would involve the conduct of further research, more of an operational than an academic nature, to ascertain appropriate models for implementing school gardens in different contexts. As noted above in the paragraph on case studies, optimal impact pathways have to be determined and these will depend on local conditions, including the institutional framework. Evidence has to be developed and presented in an attractive form for communication to policy makers.

In particular, Education Ministries have to buy into school gardens. Outscaling of school gardens can only occur through Education Ministry support. Consequently a major challenge for the next phase of VGTS will be to get Education Ministry ownership of efforts that to date have for good reason been driven principally by Agriculture. Nepal has initiated conversations along these lines, but achieving institutionalization in the school system requires the incorporation of gardens into the formal curriculum and the development of appropriate teaching materials.

Institutionalization has so far been weakest in the Health Ministries. While the kind of investment in physical WASH facilities made the first phase of VGTS in Bhutan, Indonesia and some schools in Burkina Faso, may, for cost reasons, not be feasible as an integral part of scaling out in the future, there are other avenues that can be explored. There may be mechanisms to encourage community level investment as observed in Bhutan and there should be opportunities to link school gardens with public health outreach activities. Both should be explored in the next phase preparatory to full outscaling.

## Implementing School Gardens

VGTS has successfully established school gardens in low-income rural communities where they have generated some interest among students, parents and teachers. While there is some mention of pest and disease problems, the critical limit on school gardens is the availability of space and water. To some extent vertical gardening techniques are being used to deal with space constraints, but overall the size of school gardens in all but a few exceptional cases is such that school gardens cannot make a meaningful contribution to vegetable consumption of the student body. More intensive garden management is unlikely to change this due to limited gardening skills of teachers and problems of maintaining gardens during school holidays. Thus, school gardens have to be seen like school chemistry labs. Both are teaching tools not large-scale production facilities.

School gardens can be more closely tied to other vegetable growing efforts, for example, as in Indonesia where there are links to home garden programs. In Bhutan boarding schools could be an opportunity. In Nepal agricultural extension focuses on commercial vegetable production and there could be opportunities to link with semi-commercial student vegetable projects as part of the vocational agriculture curriculum.

## Project Management

Despite significant management issues early on in VGTS, a great deal has been accomplished both in research and in establishing school gardens. These issues were more among the international partners while the country teams were much less affected. The University of Freiburg has assumed some overall management functions, providing stability. However, neither the University of Freiburg nor the Swiss Tropical Health Institute (TPHI) has indicated aspiration to assume management responsibilities in a future phase. At the same time the international partners remain reluctant to express confidence in the resumption of management responsibilities by the original implementing agency, AVRDC. In the absence of a clearly defined alternative, and taking into account the grave difficulties of a new partner entering VGTS to take over management, there is a clear challenge to clarify the future management structure in order to set the stage for continuing this work.

The VGTS strategy remains promising and the country teams are assets that should be fostered rather than abandoned. Perhaps restructuring this work into a new framework, for example, with a West African or African project and a South Asian or Asian project could be a fresh way forward.

## RECOMMENDATIONS

**1. The innovative strategy of VGTS should be pursued further.** Linking school gardens with nutrition and WASH activities into an integrated effort to improve nutrition is a promising approach supported by emerging evidence from state of the art studies.

**2. Effective country teams are key assets for future efforts.** VGTS has established effective country teams that bring together various ministries to improve nutrition by promoting school gardens, nutritional education and WASH. Before VGTS such integrated efforts were absent in the participating countries. Follow up should capitalize on this inter-ministerial collaboration in order to bring to scale the potential nutritional impacts derived from an integrated approach.

**3. School garden leadership has to shift to the education system.** It is not unnatural that the first phase of VGTS was driven by agricultural agencies which were introducing gardening into schools. Ultimately, though, school gardens have to be institutionalized in the education ministry, school curriculum, and teaching materials. Embedding school gardens into the education system in the next project phase is a prerequisite to subsequent outscaling of school gardens.

**4. Links to other programs should be strengthened.** VGTS shows that school gardens improve knowledge and change attitudes, but there is no evidence that school gardens alone can produce enough vegetables to significantly change nutritional intake. Various country specific approaches should be tested in case studies that connect school gardens, for example, with home or community garden programs, school feeding programs, boarding schools, vocational agriculture education, public health outreach etc. Optimal pathways to nutritional and health impacts have to be identified for each country.

**5. Evidence based outreach to national policy makers is essential** to win a national commitment to institutionalize the VGTS strategy. Communication of the research results coming out of the first phase along with progress in linking to other programs in the second phase, will be key in convincing decision makers.

**6. Project management issues must be resolved.** Despite significant management issues in the early stages of VGTS, it is producing important research results and has succeeded in implementing school gardens. Project management has been stabilized on an interim basis that does not seem viable for the longer term. Bringing in a new partner to manage the project entails important risks while reversion of management responsibilities to the original implementing agency does not appear attractive to other international partners. At the same time, given the differences among the countries it is not clear that it is essential to maintain the current composition of participating countries. It might be more desirable to continue this work through separate projects, for example, South Asia, West Africa and Southeast Asia.

## 1. INTRODUCTION

**Background to the Review:** From its inception, an external review of the SDC funded “Vegetables Go To School” project has been envisaged. SDC has drawn up Terms of Reference for the evaluation which state the following:

“The *external evaluation/peer review* should review the program as a whole and also serve as a source of information for potential future donors. In addition, it is expected that findings of the evaluation can be used as a planning basis to inform program adjustments and activities for a next phase. So far the VGTS project hasn’t been evaluated externally.

*The objectives of the evaluation are:*

- Assess VGTS as a whole and in the different countries (Bhutan, Nepal, Burkina Faso, and Indonesia) with regard to its relevance for stakeholders, effectiveness, efficiency and risks/potentials for the mid-term future.
- Provide relevant and feasible recommendations for the improvement of country-specific interventions and activities for subsequent project phases.”

The evaluation team was chaired by Douglas Pachico and included John Mumba (see brief profiles in Appendix IV). It was initially envisaged that there would be a third team member, but the unsettled situation in Nepal prevented her participation.

The activities of the evaluation team are detailed in Appendix III.

The underlying philosophy of the evaluation is to examine ongoing and past VGTS activities, including research, partnerships, and management, with a forward looking view focused on how the objectives of improved nutrition and health can be realized through school gardens and associated efforts in tropical countries.

**Outline of the Review:** Since VGTS is at heart a research in development project, the first part of this evaluation reviews the three major research components:

- Randomized Control Trials to measure the effects of VGTS, led by AVRDC.
- Case Studies of WASH interventions led by the Swiss Tropical Public Health Institute (TPHI)
- Collaborative Research Environment a web based data warehouse with analytical tools developed by the University of Freiburg.

The development activities that generate the project data are undertaken in Bhutan, Burkina Faso, Indonesia and Nepal. There is a detailed discussion of

progress, problems and potential for the future in a report on each country that follows a standard set of topics. The countries are presented in the order that they were visited.

The final section of the report is explicitly forward looking. It examines issues around the institutionalization of school gardens; it reviews project management; and it suggests some possible future paths for the project.

## **2. RESEARCH**

**2.1 Impact Assessment- Randomized Control Trials:** A study using a randomized control design to assess the impacts of school gardens linked to complementary interventions in nutrition and WASH is a key part of the VGTS research agenda. This study has had a major influence on the entire design of the first phase of VGTS, largely determining, for example, the selection of schools to be included in the project. Methodologically, randomized control trials are the current gold standard for impact assessment in the international agricultural research system.

Data have been collected through a questionnaire designed for use by children. VGTS country teams have done the critical job of data collection. A complete year of data (baseline and year end) has been analyzed from Nepal while analysis is currently underway for Burkina Faso. Collection of a full year of data for Indonesia and Bhutan is nearing completion, and this data should be available for analysis in early 2016. A second year of data from Nepal and Burkina Faso is expected to be available and analyzed by mid 2016.

Analysis of the first complete year of data from Nepal is well advanced and a draft paper finds that school gardens appear to make a significant difference in nutritional knowledge and attitudes between students in the school garden program and students from control schools that have not participated in the school gardens. This is a measurement of an intermediate outcome rather than final nutritional or health status. It is based on a logical progression from knowledge to attitudes to behavior to nutritional and health status.

In sum, VGTS is using an appropriate methodology to fill a gap in knowledge about the effects of school gardens in a developing country context. Data collection by the country teams is well advanced while AVRDC has taken the lead in study design and data analysis. Preliminary results are encouraging.

**2.2 Case Studies- WASH:** One of the most innovative aspects of VGTS is its integration of water and sanitation efforts with those in agriculture and nutrition. As discussed below in section 3, this integration occurs at the school level in Bhutan and Indonesia where the establishment of school gardens is

accompanied by investment in physical infrastructure for water and sanitation. At the same time, WASH is also a major element in the VGTS research agenda.

Case studies on WASH are being implemented through the Swiss Tropical Public Health Institute with national partners in Burkina Faso and Nepal. While the overall research design of the case studies is coordinated by a professor at TPHI, fieldwork and analysis of the case studies is being implemented with national partners through two PhD research theses, one in Burkina Faso and the other in Nepal. The overall goal of the case studies is to assess the effects of the complementary school garden, WASH, health and nutrition interventions in Burkina Faso and Nepal through baseline and end line surveys with a range of previously identified nutrition, WASH and health indicators.

The case studies have required the collection of a very substantial amount of data including anthropometry, hemoglobin, stool parasites, community and household drinking water quality, a questionnaire of children's knowledge, attitudes and behavior, and a questionnaire with children's caregivers on their knowledge, attitudes and behavior as well as household socio-economic characteristics. This is a very impressive range and amount of data to collect, and it is far advanced. Preliminary analysis of baseline data is already well underway. Good progress is being made in data collection and analysis and there is a strong expectation that important and unique results will be forthcoming from these case studies.

**2.3 Collaborative Research Environment:** The Collaborative Research Environment (CRE) is a VGTS effort led by the University of Freiburg for management of project data on the internet. The platform has been functional since March 2014 and now includes, for example, data import conversion and exchange tools, data model management functions and data visualization and analysis tools. It has been planned to link to the AVRDC Nutrient Data Base. General data on the schools has been entered for the participating schools in Bhutan, Burkina Faso, Indonesia and Nepal. Data on households of the school children (e.g. household size, income, economic situation, eating and cooking habits, etc.) has been added to the database. The baseline data from the randomized control study has been entered and is available in the CRE through the internet. Clearly very significant advances have been made with the CRE.

At the country level internet access is variable, both between countries and within countries, for example, with better access at the ministerial capital cities than in rural schools. Data entry was initially envisaged as being direct through the Internet, but to accommodate local needs, adaptations have been made so that the CRE now accepts Excel files. A mobile offline data collection app for smartphones or tablets is being developed.

The platform is designed in a modular way fashion to permit further improvement. Several features could be added in the next project phase (e.g. offline data

collection tools, advanced data analysis tools, communication tools).

The CRE is clearly useful in providing a public good by storing and making available information accumulated through the VGTS. With the structure of the CRE now established, future attention needs to be placed on promoting the use of the CRE. The international research partners have so far been quite capable of managing their own data. While the CRE adds value in storing and making their data publically available, the CRE has not been a precondition for progress in VGTS research. The CRE could be valuable in the countries, though in the evaluation no evidence of such interest was detected either at the school or country team despite a proactive questioning on this point. Perhaps its potential as a resource for advocacy with national policy makers might make it more attractive. The CRE's value, therefore, may currently lie principally with the wider public or with interested stakeholders like the SDC besides its potential for communication with national policy makers.

### **3. COUNTRY REPORTS**

#### **3.1 INDONESIA**

**Institutionalization:** The Director of the Center of Consumption and Food Safety in the Food Security Agency (FSA) is very well informed about the VGTS project and clearly committed to its success, accompanying the review team during part of its fieldwork and ably briefing the team on the project. The FSA has driven the project in Indonesia and has taken the lead in training teachers.

There is already a major school garden program involving 8,000 schools in Indonesia. The existing program only distributes seed but unlike VGTS does not provide teacher training, infrastructure investment or the monitoring and evaluation research. The FSA also has an ongoing program of supporting women's home garden programs and has connected these activities to the VGTS, with the women's garden groups serving as nurseries to supply planting materials for the school gardens. The home garden groups are receiving resources to help establish their nurseries as well as training from agricultural extension workers.

The FSA has been very effective in linking directly with project schools and gaining the support of school headmasters to implement the VGTS project that in all schools includes significant investment in upgrading sanitation facilities. However, while solid inter-ministerial (agriculture, education, health) collaboration is producing results at the school level, and local health workers were encountered at a couple of the schools, such inter-institutional commitment has yet to be established either at the Director level nationally or systematically at the district level. Clearly, moving towards a scaling up of the VGTS approach in a follow on phase requires formal involvement of at least the Ministry of Education.

The FSA Center Director is aware of this need and expresses willingness to take the initiative to engage peers in other Ministries. The Center Director sees the international platform of VGTS as an asset in convening across ministries. Moreover, the FSA is acutely aware of the value of VGTS research to produce evidence on program effectiveness that will be critical to convince policy makers both at a higher level in the FSA as well as on an inter-ministerial basis.

**Capacity Building:** Two staff attended the training of trainers event at AVRDC. In retrospect, there is a greater awareness of the need to select candidates for such training who have the skill set for effective transmission of their learning. The evaluation team interviewed several teachers who attended the in-country training event. Teachers reported satisfaction with the training they received on the basic techniques of vegetable production and elementary nutrition concepts. Some teachers noted that disease and pest control are important problems about which more training would be useful.

**Country Team:** The Country Team has impressively energetic, strong, capable leadership that deserves credit for the significant progress that has been achieved. Support staff from FSA are also committed to the project. The major opportunity for enhancement of the country team's effectiveness, as noted above in the section on institutionalization, is to formally engage education and health personnel into the country team. Most country team personnel are female, including the Team Leader.

**Garden Establishment:** The Evaluation Team visited 8 of the 15 schools that have been in VGTS since its inception. In all cases gardens had been successfully established and planted well in advance of the Team visit. About half the schools rely on raised beds for their gardens, but the other half are very space constrained, depending solely on planting in pots and vertical garden racks. VGTS has also installed irrigation tanks and screen house nurseries in nearly all schools. Schoolteachers and headmasters report that getting water in the dry season for irrigation is the main problem in cultivating the gardens. Care of school gardens during vacations is also reported to be a problem.

Produce from the school gardens in some cases is consumed in a school lunch provided on a once a week basis. Because lack of space so limits the amount of vegetables that can be produced, total production from the school gardens the Team visited cannot make a significant to nutrient intake for the school's student population. Consequently the purpose of the school gardens in space constrained Java has to be as a learning tool to teach the importance of improved nutrition through vegetables as well as to encourage home vegetable gardens.

Vegetables have traditionally been an important part of the diet in Java. However, with the penetration of elements of urban culture into rural Indonesia,

food habits are changing. There is an increased consumption of industrialized snack foods that have become widely available, and children are frequently consuming such “junk” food for lunches and snacks, particularly because with labor force responsibilities parents often no longer prepare all family meals. The FSA leadership fully appreciates that learning about better food habits and changing attitudes, has to be the main purpose of school gardens in Indonesia rather than direct production of an increased quantity of vegetables for consumption.

School garden activities are undertaken on Saturdays in Indonesia. Saturdays are half school days, dedicated to physical education and other extra curricular activities. This approach should facilitate the scaling out of school gardens since they do not compete with the core school curriculum. One consequence of this is that in many schools garden activities are led by the physical education teacher. While the teachers were all enthusiastic, some made it very clear that they had no background in vegetable gardening and the VGTS training was absolutely necessary for them.

**WASH:** All 8 schools that were visited had hand-washing facilities in good working order that had been provided by project funding. Hand soap was available in all schools. Garbage containers provided by the project were observed in all schools. The evaluation team also visited the male toilets in most schools and these too were all in clean condition. Of course the schools knew ahead of time of the visits of the evaluation team, so we cannot be certain that the WASH facilities are always properly maintained, but they clearly were so at the time of the visits, indicating at a minimum an awareness of how things should be and the capacity to keep them in proper condition.

**Student Learning:** Students were interviewed in groups so the knowledge of all individual students was not assessed. Individual students were able to respond with basic knowledge about the importance of vegetables in the diet and some were able to respond with learnings like the relevance to carrots to healthy vision and tomatoes as a useful source of vitamin C. Compared to students interviewed in a similar format in Bhutan and Nepal, Indonesian students appear to have absorbed more basic knowledge about vegetables and nutrition.

In a couple of schools the Evaluation observed a very complete manual of lesson plans for the school garden activities with a meticulous weekly report on the lessons. It is understood that the other schools used the same structured curriculum approach. Such a systematic step by step approach to the garden activities and the intended lessons from each activity is crucial for school gardens to be more than an entertaining pass time.

**Project Management:** At the senior policy level nationally, leadership, oversight and management has been strong. There has been a change in the country manager, but the current incumbent is so competent, informed and engaged, that

this change has not adversely affected implementation to any obvious degree. The work of the international project manager originally contracted for VGTS is appreciated and there are no complaints at the country level about her performance. There is awareness that there have been differences among and within the international research partners, and though reluctant to go into details, there is a general sense that these differences have not been helpful.

**Future Prospects:** All school headmasters and teachers were positive and enthusiastic about VGTS. They expressed enthusiasm about continuing with the school gardens. Headmasters consistently reported that they had discussed the project with headmasters of non-participating schools and advocated the expansion of school gardens to their peers.

As noted above, at senior levels in the FSA, there is an acute awareness of the need for and a commitment to improving coordination with other ministries. Moreover, the purpose of the school gardens is principally didactic, to teach better food habits rather than to directly increase the availability of vegetables for consumption. A key part of going forward, therefore, is seen to be integrating nutrition and hygiene into the school curriculum.

Accepting the space constrained nature of school gardens in Java and directly confronting the challenge changing diets, attention could be shifted to peri-urban settings nearer Jakarta. The FSA believes that local government in this context might be particularly supportive and of course formal engagement with the education and health ministries would be sought. The international platform provided by VGTS along with the scientific evidence on the effectiveness of school gardens can be instrumental in making these linkages. At the school level, connections would be intensified with community organizations, parent/school associations and home gardens.

In this vision the next three years of VGTS in Indonesia would be a pilot out-scaling phase. It would focus on building a cross ministry effort in a peri-urban setting. Strategies would be tested of involving school gardens with partners like parents or women's home garden groups and evidence would be collected on how these strategies result in outcomes in terms of knowledge, attitudes and behavior related to vegetable consumption. Strengthening links to the parents and communities are crucial to this endeavor.

If successful, a subsequent three-year phase would involve an Indonesian driven and resourced effort to substantially out scale school gardens with VGTS serving as an international platform to exchange experiences and to provide technical backup for capacity building, monitoring and evaluation, hygiene and data warehousing.

## 3.2 BHUTAN

**Institutionalization:** VGTS in Bhutan is firmly institutionalized as an inter-ministerial effort involving agriculture (through the Council of Renewable Resources Research, Bhutan, CoRRB) , health (Royal Institute of Health Science, RIHS) and education (Department of Schools and Education, DES). This institutionalization functions both at the senior policy level and at the operational field level. The VGTS project has been integrated into the 11<sup>th</sup> National Five Year Plan with the approval of the Prime Minister's office. Senior policy support for VGTS was evinced personally by the Minister of Agriculture in his meeting with the Evaluation Team. He was well informed and highly supportive of VGTS. Likewise the magistrate of Punakha District, where some VGTS schools are located, attested to the project's attractiveness and advocated extending its work in particular to boarding schools. Furthermore, district level education and agriculture officers are supportive of the project in Punakha and Tsirang districts where the Evaluation Team also met field level personnel who are involved in project implementation.

VGTS is linked to an existing national program between the ministries of agriculture and education, the School Agriculture Program (SAP) which, in addition to livestock activities in some schools, distributes seed for school vegetable gardens without the systematic capacity building, infrastructure investment and explicit links to public health as provided by VGTS.

In line with the national objective of Gross National Happiness, policy makers are concerned whether or not agricultural interventions have clearly impacted on health and nutrition and express interest in having better information on which interventions make the most difference in nutrition. Thus there is senior level interest in the research outcomes of the project. The interest in research on whether VGTS is making a real difference appears sincere. Evidence on whether this is truly an effective approach would be sincerely welcomed as a basis Bhutanese decision on how to scale up such efforts in the future.

It is not clear, though, that VGTS has fully engaged with mid-career national scientists as active participants in the research process beyond field level data collection. It does seem that VGTS has not taken complete advantage of capacity building opportunities through co-involvement of national scientists in the research process. Bhutan is not completely unique in this aspect and this deserves consideration by the international research partners with respect to any follow on research activities.

Greater national involvement in the research is not purely a question of capacity building. If VGTS evidence is to constitute a basis for future national decision making, as it should be, it is important that national policy makers and scientists have been engaged from the beginning in the framing of research questions and

analysis of the results. Such national buy in and participation could be critical to the acceptance of VGTS research results as a convincing basis for decisions.

**Capacity Building:** Like other participating countries, Bhutan participated in the VGTS training of trainers and the policy makers workshop, and this was followed by in country training that included gardening, wash, and nutrition components. Training of teachers was conducted in three separate short courses. Participants indicated that these events were generally useful but emphasized that practical field exercises were especially valuable. In addition, 10 Bhutanese teachers visited Nepal in February 2015 as part of a cross learning exercise.

**Country Team:** The Country Team is solid. It has active involvement of capable mid-career professionals from agriculture, education and health who appear to work together effectively. Country Team leadership is impressively strong, active, and forward looking. Due to other responsibilities the Country Leader is no longer able to devote 100% of his time to the project, but an energetic and capable assistant has been appointed to manage the daily operations of the project. Working closely with senior Country Leader, this arrangement performs well. The senior country team member for health is female, while other members are male.

**Garden Establishment:** The sampling strategy to select schools for VGTS in Bhutan was not restricted to one or two districts like in Indonesia and Nepal so the project schools are widely distributed across very difficult terrain that is served by an extensive but basis road network. Although 25 gardens are reported to have been established, movement around Bhutan very time consuming among widely scattered schools, so that only two schools were visited during the evaluation. These school visits were complemented by bringing the focal VGTS teachers of three other schools to meet the Evaluation. Some brought convincing photographic testimony of VGTS project activities and all had a good awareness of the objectives of the project.

Both schools that were visited in person had spacious well established gardens with a variety of vegetables. VGTS provided training, seeds, tools and fencing materials for the gardens. Produce from the gardens is not sufficient for regular school feeding of all students. One school has prospects of establishing a larger garden with this aim, but this is likely to be an alternative only for a minority schools. Distribution of produce seems informal, with some being given to participating students and some apparently going into periodic (monthly?) school meals.

Although gardens here are substantially larger than in Indonesia, and the Evaluation admittedly did not take measurements of the garden sizes, observation suggests that even these larger gardens in Bhutan can not plausibly produce enough vegetables to feed the entire school population (70-150 students) on anything approaching a regular basis. Just as a high school chemistry lab is a learning tool rather than an industrial scale producer of plastics

or other chemicals, so also the school gardens function for didactic purposes rather than vegetable production. That said, production is of sufficient scale to introduce new vegetables to the community for trial.

The teaching potential of the school gardens is enhanced by an extensive use of home made posters observed on school walls as well as by the composition of a vegetable song that the children have learned. Such creative approaches to re-enforcing the pedagogic purposes of the school gardens are praiseworthy.

Traditionally vegetable consumption in Bhutan has been limited. Especially at higher altitudes vegetables are only available seasonally, and vegetable diversity is not high, restricted mainly to potatoes and radishes. At lower altitudes collection of wild greens is a common practice and may be more widespread historically than cultivating home vegetable gardens. Thus promoting vegetable growing and consumption represents a real change in dietary habits. In addition to raising awareness of known vegetables (e.g. tomatoes, peppers) through the school gardens, VGTS is also introducing new vegetable alternatives in Bhutan: bean sprouts, lettuce, amaranthus, and sufficient quantities of these new options can be produced in the school gardens to serve meals to a large number of peoples to familiarize them. There is no local tradition of eating raw salads and this may have been a sensible adaptation to the absence of clean water and proper sanitation

Because of the lengthy cold season, ways of insuring vegetable availability for a longer period of time need to be brought into VGTS in Bhutan. One approach is to use protected cultivation to extend the growing season. The other approach is to process vegetables for storage, for example, through pickling, fermentation or drying. While there is some traditional use of these practices, in order to increase year round consumption of vegetables in Bhutan it is a priority both to use protected cultivation to expand the growing season and to use local processing to increase vegetable availability in the winter.

**WASH:** Sanitation facilities seem to be having a very significant impact in Bhutan. VGTS has provided hand-washing facilities in project schools, similar to those in Indonesia, and the male latrines inspected by the Evaluation were in good condition. Perhaps more important than the infrastructure, a very strong teaching effort is obviously being made around improved sanitation practices in Bhutan. In addition, explicit efforts have been made to reach out through the schools to the broader community. For example, some schools had events to bring parents in to events during global hand washing week. Similarly, in some schools the parent/teachers association was mobilized to raise fund to buy hand soap for the schools.

Investment in appropriate hygiene infrastructure may be as important as a teaching tool as it is for its direct health impact. The visible physical existence of

washing facilities and latrines at schools may be an important part of teaching children and demonstrating to parents their importance.

**Student Learning:** As discussed above, due to active efforts, awareness of improved wash practices appeared strong in interactions with groups of students. Because the VGTS schools are based in rural areas, most students come from a farming background so cultivating plants is not a completely unfamiliar activity for many students. It can be argued that school gardens are not essential to teach nutrition or sanitation, but establishing school gardens can motivate and encourage teachers to pay more attention to nutrition in the curriculum.

A manual for teachers has been drafted. This manual should be edited to reflect specifically Bhutanese circumstances rather than rely on examples drawn from other VGTS countries. Such a manual is crucial to ensuring student learning beyond the field experience of gardening, and needs to be produced at a massive enough scale to be used in any future out scaling.

Besides entering the curriculum in the middle grades as VGTS currently does as a relevant part of health and nutrition learning, there is also an opportunity for school gardens to come into the curriculum in grades 9-12 as a vocational education option.

**Project Management:** Compared to Indonesia or even Nepal, the small size of Bhutan creates a context in which there is a web of relations among staff both within and between ministries that facilitates very smooth interactions among agencies. Country staff from all involved ministries were informed, thoughtful and reflective in their discussion of the project to date and its potential future. There is no reason to doubt their capacity to implement a further phase of the project in the case that one is forthcoming as initially planned.

At the country level the efforts of the original international project manager contracted by AVRDC for VGTS was seen as useful in getting the project started, if somewhat assertive in style. More seriously, lack of clarity about the research protocol at the international level is felt to have delayed for a year some critical project activities, for example, in data collection. This led the Bhutan team to go ahead with its own baseline survey. In addition, WASH activities appeared to be a last minute addition to VGTS and this did not facilitate its proper integration into the project from its inception.

**Future Prospects:** Senior policy makers have a sufficiently positive impression of VGTS to call for a second phase of the project to bring gardens to more schools. Monitoring and impact assessment is seen as an important dimension of further work to strengthen the evidence on the effectiveness of school gardens to justify future national scaling of gardens and their incorporation into the ongoing curriculum..

There are 550 primary schools nationally, of which 35 will have been covered by the end of the current phase of VGTS. About half of primary schools (265) have an agriculture program, and some of these schools would be the obvious targets of any next phase. If the first phase was pilot testing of the garden concept, the second phase would be for pilot extension of the concept.

As discussed above teaching materials for gardening have been drafted and need to be published and distributed with appropriate training of teachers. There is a similar need to develop teaching materials on nutrition and sanitation and to provide integrated training to teachers on all three materials. The Swiss Tropical Health Institute could be well placed to support the development of appropriate curriculum material on sanitation while among the current international partners, AVRDC's Nutrition team might be best placed to support the development of the nutrition curriculum with Bhutanese partners.

All schools have Parent Teacher Associations and parents and PTA leaders were present at the Evaluation visits, demonstrating their interest in VGTS. While teachers in many of the current VGTS schools have reached out to the community for engagement around home gardens, this is a strategy that should be formalized and explicitly tested in any second phase. This could involve institutionalizing linked activities between teachers responsible for school gardens and agricultural extensionists promoting home gardens. It is not clear whether the existing international partners are equipped to support these activities but the AVRDC Global Technology Dissemination group may come closest to being able to fulfill this role.

Similarly, VGTS schools could be linked with targeted parallel campaigns on health and sanitation at the community level. This has not been systematically tried in the first phase so the viability of this approach needs to be tested. Thus while the first phase tried to integrate agriculture, nutrition and health at the school level, a second phase would need to enhance the nutrition and health dimensions at the school level while simultaneously testing the practicality of integrating these school level efforts with parallel activities at the community level.

Greater engagement of the country team in the discussion of data collection and analysis would be appreciated. It is recognized that the international research partners have a high level of expertise that legitimizes their research leadership, but Bhutan is not totally without capacity to participate more fully in the research beyond merely collecting, transcribing and delivering the data.

### 3.3 NEPAL

**Institutionalization:** VGTS is firmly institutionalized in Nepal with strong commitment from the Ministries of Agriculture, Education and Health. VGTS has been led by the Ministry of Agriculture through the National Agriculture Research Center, NARC. The Country Team member from NARC has been the main driving force in the project, and NARC staff have taken the lead in project implementation. The Director General and indeed the entire senior management team of NARC are familiar with the project, support it strongly and wish to continue it.

The Ministry of Education is strongly committed from the Director level through the provincial level, to the local school level. Even though the first phase of VGTS has a strong research element making it logical that a research institute like NARC has so far provided project leadership, ultimately to reach the national level a school gardens program has to be implemented through the Ministry of Education since it is responsible for 29,000 schools in Nepal. NARC would continue to play a key role in capacity building and perhaps in monitoring related research, and indeed at the senior level NARC currently aspires to continue leading VGTS. While there is not a sense of tension or competition between the two ministries for control of VGTS, there is not yet a clear agreed vision about how this work could evolve so that it eventually becomes what it fundamentally is, a project implemented at the school level by teachers and headmasters.

The Ministry of Health has had substantial involvement in the project and has competent, informed senior leadership participating in the Country Team. The Health Ministry has participated in the design of research questionnaires and teaching materials and is linked to a national school nutrition and health framework. The Health Ministry has staff at the district level, including both a nutritional focal person as well local health workers who do health and nutrition education and provide basic health services through local health posts. These local health posts are also responsible for periodic national studies of growth monitoring in under fives in a sample of districts. It would seem attractive to link these health workers to the nutrition and health activities of VGTS. However, these local health workers already have a demanding set of responsibilities and how school gardens could become as asset rather than an additional burden for them remains to be worked out. It would appear attractive to mobilize the district Health workers to link between school gardens and the wider community, but the modalities for doing so have yet to be tested.

There is an eagerness especially to take responsibility for school gardens programs in the Ministries of Agriculture and Education. They share a strong conviction that sustainable institutionalization depends on government implementation of school garden programs rather than outsourcing project implementation to NGOs. It is recognized that government administrative procedures are not always as agile as those of NGOs, and NGOs are therefore

sometimes seen by international agencies as preferred partners for short-term project implementation. However, if the vision of school gardens is for their sustainable implementation beyond the fixed term life of an externally funded project like VGTS, then such a vision can only be realized through engagement with and the commitment of government agencies.

Sanitation does not fall under the mandate of the Ministry of Health. Physical investment in water and toilets comes under the Development Ministry. Thus, the full integration of agriculture, nutrition and public health around school gardens may require an even more complex inter-institutional coordination, involving more than three Ministries and perhaps as many as five. This is such a daunting prospect that the Evaluation could not recommend at this point bringing in even more agencies to the project. Nevertheless, over the longer run, implementation of a fully integrated approach may have to confront this.

There is an acute awareness of the need for high level advocacy for the school garden approach. The Country Team member for NARC is developing a multi-pronged effort including media events and a variety of publications to make this case. Even the presence of the Evaluation was turned into an opportunity for an interview with Radio Nepal. As part of this advocacy process, there is recognition of the value of the research being carried out with the international partners.

**Capacity Building:** NARC has played a very proactive role in providing training to focal teachers and headmasters as part of VGTS. Teachers are positive about the training they have received. However, to scale up this program nationally over thousands of schools will surely eventually exceed NARC capacity. Moreover, training large numbers of teachers at NARC's national training center at Kumaltar in the Kathmandu Valley may not be the most economical approach to scaling out. The Country Team is already thinking about engaging teachers with VGTS experience to become trainers of new teachers in schools being brought into the school gardens program. Not only will this be more economical and overcome capacity constraints, it will also mobilize the experience of teachers who have practical experience in working with students and the community in school gardens.

In any subsequent phase of VGTS as part of the pilot in scaling out, NARC should design and implement a program whereby VGTS focal teachers become trainers of other teachers. This would involve a national workshop with selected focal teachers to develop appropriate training materials and design training courses to be carried out at the district level in districts selected for the second phase. The AVRDC Global Technology Dissemination staff could be a useful resource in this process.

**Country Team:** The Country Team member from NARC is doing an outstanding job and has been the main driving force in the project, insuring that project implementation objectives are met while reflecting insightfully about how the

project can be sustained and improved. The original Country Manager has been replaced and a substitute named who is in the process of familiarizing himself with the project and whose effectiveness resides principally in accepting the guidance of the Country Team member from NARC.

**Garden Establishment:** While Nepal faces similar terrain and road net difficulties as in Bhutan, the VGTS schools are less geographically dispersed so it was possible to visit more schools (4) than in Bhutan (2) but less than Indonesia (8) where the schools are geographically concentrated and served by a better road network.

The Evaluation observed well established gardens in all the schools. Most have good sized plots, but one school plot was on rented land which would not be viable in the absence of VGTS funding. Another school had quite limited space and like many Indonesian schools relied on plant pots to a considerable degree. Settlements in Nepal, and consequently schools, are often on ridgelines where access to water is not always straightforward. For scaling out it would seem advisable to make access to sufficient land and adequate water a precondition for inclusion in school gardens.

Without adequate land or water, school gardens are unlikely to be successful or sustainable. Investment to overcome these obstacles would in the first instance be too resource intensive to make the out scaling affordable for the government. While it can be justifiable to make such investments at the pilot project phase when research is a major objective and external funding is available, at a subsequent scaling phase it is not viable. Out of 29,000 schools nation wide, thousands will have the water and land for school gardens. Even though school gardens may not be suitable for all schools, still this opportunity should be seized where they are feasible.

All schools reportedly have parent teacher associations in Nepal, and the visited schools certainly had very active parent presence at the time of Evaluation. There is a clear opportunity to build on this strong parental involvement to link the school gardens with home based gardening and nutritional awareness. How to do this more effectively, is something that could be pilot tested in a subsequent phase. Both the University of Freiburg and AVRDC have expertise that potentially could be deployed to support this initiative.

**WASH:** It is notable that unlike Bhutan and Indonesia, there are few significant investments in sanitation infrastructure in VGTS schools Nepal, with the notable exception of one school where a dual purpose water supply was brought in for sanitation and irrigation. Consequently the Evaluation was less attentive to examining water and toilet facilities in most of the schools. However, the casual observation indicates that facilities are not up to the standards observed in Indonesia and Bhutan.

To some extent, the Country Team attributes this to the WASH budget having been invested in support of the WASH case study discussed above in section 2.2. That study is certainly worthwhile and its implementation required significant resources. The argument can be made that higher level information on the baseline health status of children in Nepal is of broader benefit than improved WASH facilities in a handful of schools. However, to pursue the case studies further to assess the effects of implementing a program like VGTS would be hampered in Nepal by the lack of attention to WASH investment in physical facilities and the associated lesser focus on teaching WASH in the schools.

As discussed above about the gardens, access to water for irrigation is a problem in many schools in Nepal. Clearly priority should be given first to water for drinking and sanitation, and only once that is assured, to irrigation for the gardens.

**Student Learning:** Health and nutrition are compulsory topics in the curriculum of grades 4-10. This is one opportunity for institutionalizing school gardens into the curriculum. Alternatively, in the higher grades (8-10) there is an occupational or professional option in the curriculum. This allows students to choose information technology, science, crafts and agriculture. School gardens could also be tied to the agricultural curriculum. This might be especially attractive for schools located where vegetable production is increasingly a commercial activity.

Planners have long envisaged that Nepal has a comparative advantage for producing vegetables in the hot season in the hills to supply both its own low lying areas in the Terai and also potentially for export to immense urban markets in India. In this context school gardens would not focus on nutrition and health alone, but also in teaching children about commercial horticulture. The school gardens could be linked to small scale commercial projects undertaken at home by the students, often with participation of parents on the family farm. A trial of linking school gardens to vocational education about agriculture should be pilot tested in a number of schools in a next phase of the project. The intent is not to replace VGTS focus on integrating agriculture, nutrition and health, but rather to strengthen the entire school garden approach by linking it to vocational education where relevant. The University of Freiburg and AVRDC both have expertise that could support the expansion of VGTS activities along these lines.

**Project Management:** Overall project management has been good. Frequent rotation of personnel is, however, a characteristic of public administration in Nepal, and this can negatively affect project management. For a potential future phase it might be possible to negotiate a commitment for personnel stability over the life of the project. This might be achieved through the creation of a project funded position for the Country Manager. Since Country Team members are not VGTS employees, they necessarily have other responsibilities.

**Future Prospects:** A preliminary analysis of the direct costs of establishing school gardens through VGTS has been undertaken in Nepal. Not including indirect costs of training or technical support from the project, teaching materials, or the opportunity cost of land, it is estimated to cost as much as \$US 1,000/school to establish a garden. An investment of \$1,000 per school may be highly worthwhile in terms of health outcomes achieved. Nevertheless, it is a daunting amount for individual schools to invest or for the central government to finance in an out scaling effort. Not all of these costs need to be cash costs. For example, some labor can be provided by the community along with other local inputs like manure or fencing materials.

Thus, while the Nepali cost analysis is clearly very preliminary, it does point to the need to think through in advance the resource requirements for scaling out at a wider, even national, level and for maintaining the program over time. For example, both in Nepal and Bhutan the country teams emphasized how helpful it would be to have project vehicles to support work in schools dispersed across difficult terrain. While this adds an additional cost to the work, the requirement for transport would seem to only increase as the project moves from research towards scaling up across a wider number of schools. This is another difficult budgeting decision that remains to be sorted.

The randomized control trials discussed in 2.1 and the case studies noted in 2.2 of this report both can shed some light on the potential gains from school gardens. Research on the effects of school gardens needs to be pursued further. Longer term cohort studies would be ideal to fully quantify the impacts of school gardens down the chain from knowledge to attitudes to behavior to health outcomes. This is an ambitious research agenda that may well not lay fully within the capacity of future phases of VGTS. However, from the point of view of convincing policy makers and providing a sound basis for decision making, this is a research line that should in principle be pursued further. Planning for the research dimensions of any follow on to the current VGTS phase should take these matters under serious consideration with a view to developing a feasible research design that goes further towards addressing these issues.

At the same time, the costs of taking school gardens to scale should be considered more systematically. Comparing different strategies to go to scale has already been suggested as a tasks for the next phase, for example, by looking systematically at how school gardens can most effectively be linked to community level activities, school feeding programs, or even vocational training in agriculture with a focus on commercial vegetable gardening. The next phase of VGTS will have to make judicious decisions about which strategy alternatives are most promising and worthy of testing and study. This may very well be somewhat country specific. If different scaling approaches are piloted in the phase, some attention should also be given to looking at the resource requirements or costs of the different strategies. Even if it is over ambitious to conduct full cost benefit analysis, some general ideas about the costs of alternative scaling strategies,

and how these costs might be shared between local, national and even international actors, will be essential for budgeting for a third phase where scaling would be the central focus.

Further case studies carried out by the Swiss Tropical Health Institute could provide insight to public health aspects, while AVRDC could provide expertise in horticulture, nutrition and economics that are also components determining the effects of school gardens. The University of Freiburg has expertise not only in data management, but also in the operations of school gardens that could be relevant

### **3.4 BURKINA FASO**

**Institutionalisation:** The Director of Research and Pharmacology at the Ministry of Education, the Director of Nutrition at Ministry of Health and the Secretary General at the Ministry of Agriculture are all conversant about the VGTS project. The agriculture staff (extension workers) provide technical support to teachers in preparation of composte manure. They also assist the schools in vegetable production and pest management.

The project is implemented in two regions namely plateau central and central west. In total the project is being implemented in 30 schools. Twenty schools have school gardens while 10 are control schools. There are two focal point persons in each region. Focal point persons are from agriculture and education ministries respectively.

The project collaborates with the government in providing food for school canteens. Community members also contribute cereals to school canteens. There is great need to involve the ministry of health at this level as well.

**Capacity building:** Project staff (Project manager and data collector) and staff from ministry of agriculture provide training to teachers on vegetable production, land preparation, making natural pesticide, hygiene and sanitation.

Two teachers have been trained at each school. The evaluator interviewed the teachers that have been trained. They expressed satisfaction with the training they received. There is also demand by teachers from neighbouring schools to be part of the VGTS project.

However, school headmasters mentioned that teacher transfers have affected the program as there is movement of teachers from one school to another. The school headmasters indicated that it would be helpful if more teachers were trained so that when one teacher leaves the school, the human resource on VGTS is not affected. On the other hand, teachers leaving the school could go on to replicate the vegetable gardens in their new schools.

**Country Team:** The team coordinates the program quite well with involvement of stakeholders from ministries of health, education and agriculture. The multi-sectoral approach is yielding results as specialists from each ministry provide technical support to both the teachers and pupils. There is need to enhance this collaboration at the regional level with staff from other ministries such as health.

**Garden establishment:** The evaluator visited four schools, two in each region. In both regions, school gardens were in existence. The schools had enough land space for vegetable gardens. Each school visited had a hand pump constructed next to the school garden. Gardens were nicely fenced with a wire fence. VGTS provided the wire fence and vegetable seeds. The agriculture extension workers are working with schools to make compost manure in a bid to promote organic farming of vegetables. Pupils provide the animal droppings for use in composte.

School directors and teachers reported that animals were a main problem in cultivating vegetables especially in schools where the fence has been torn. Some schools also expressed delays in delivering of vegetable seeds to school which was attributed to lack of transport by the project team.

Produce from school gardens is consumed in school canteens. However, there is need be preserving the vegetables to ensure all year round availability of vegetables in the school canteen. Each school has also employed a garden boy who takes care of the garden.

**WASH:** Not all schools visited have WASH activities. Only one school in each region visited was implementing WASH activities. Schools implementing WASH had hand washing facilities near the garden, water taps outside the toilets. The project is in a process of implementing a WASH programme to complement nutrition interventions.

A case study has already been conducted and results of the study indicate that quality of drinking water is not good. water is contaminated with faecal coliform bacteria and faecal streptococci-at 93.7% and 92.7% respectively. Disease has a bearing effect on nutritional status of pupils as evidenced by UNICEF's conceptual framework, where diarrhoea disease is a basic cause of malnutrition. Provision of adequate and safe water would greatly improve the nutritional standards of pupils.

**Student learning:** Pupils participating in the VGTS are from grades 5 and 6. Schools also had records of baseline assessment that was conducted at the start of the project. However, they have not administered the end line survey to ascertain knowledge gain yet. Pupils in all the schools visited exhibited good knowledge of vegetables by mentioning the nutrients contained in the vegetables.

Women groups engage in group farming of cereals and legumes which they supply to school canteens. The canteens have greatly contributed to increased attendance by pupils in schools as they are kept the whole day at school. Teachers alluded the VGTS project to increased pupil performance in schools.

**Future Prospects:** School directors expressed gratitude to the VGTS project. They acknowledged that pupils have increased their knowledge regarding vegetable production and consumption. They further indicated that vegetable gardens are very helpful when teaching agricultural science as pupils are taken to the garden for practical.

The water tables usually run low during dry season. This usually affects the vegetable production as it becomes difficult to water the gardens. Breakdowns of hand pumps also hamper vegetable production in schools. Most teachers talked to expressed need for solar pumps as opposed to hand pumps.

The idea of having a garden boy at the school in charge of vegetable garden is good. Nonetheless, pupils also ought to be involved in the manual work in the garden as this will give them actual experience in terms of land preparation, transplanting and weeding of vegetables.

Data collection from the field including supervision of the project sites is limited due to lack of transport by project team. The team spends huge sums of money to hire vehicles each time they want to get to the field.

## **4 ACHIEVING FUTURE IMPACT**

**4.1 Institutional Sustainability:** VGTS has made considerable progress in the difficult task of developing effective inter-ministerial partnerships at the country level committed to supporting school gardens. Although as discussed in section 3 above, events and progress have taken unique paths in each country, some general patterns emerge. Progress has been most evident at the Country Team level where joint action between schools and agricultural agencies have succeeded in training Country Team staff, teachers and headmasters. This has led in turn to the effective establishment of gardens in the schools, changes in the school curriculum, and associated investment in WASH in most schools in most countries (WASH facilities have not been developed in Nepal nor in all schools in Burkina Faso).

Awareness of and support for VGTS is strong in agricultural agencies in all countries, ranging from the Ministerial level in a smaller country like Bhutan, to the Agency or Department Director level in Burkina Faso, Indonesia and Nepal.

Education Ministry involvement is also fairly senior in Bhutan, Burkina Faso and Nepal, while in Indonesia cooperation is effective at the school level but has not been formalized at a senior level in the Education Ministry. Indonesia is an immense country, with the fourth largest population in the world. It is understandable that running one of the world's largest primary education systems in the world, getting attention for what is in financial terms a very modest project, might naturally be somewhat challenging. Indeed it may be more realistic to seek institutionalization in Indonesia at a regional level or in intermediate levels of the bureaucracy.

While there are some linkages with Health Ministries in most countries, in general there is less active and less senior involvement from the health sector than agriculture or education. In most countries these connections need to be rethought and discussed to find points of mutual interest. These may be more natural around educational type activities than in infrastructure investment as has been the emphasis in WASH in VGTS in Indonesia and Bhutan.

Investment in physical infrastructure for WASH may be justified from the research perspective for VGTS in order to develop a better understanding of the interaction between interventions in school gardens, nutritional and health education, and physical WASH facilities. From the point of view of a sustainable institutionalization of school gardens, however, investment in WASH facilities may be difficult to institutionalize.

In the first place, such physical facilities in some countries (e.g. Nepal) may lie outside the ministries of agriculture, education or health. Thus institutionalization of investment in WASH facilities can require the incorporation of an additional set of partners. This may be too ambitious. Moreover, even the school gardens themselves are primarily a learning rather than a food production activity. Since school gardens themselves are essentially for didactic purposes, so also the most relevant WASH complement to VGTS may be health and sanitation learning rather than investment in improved facilities.

However worthy WASH investment may be, it seems like a stretch of doubtful success to expect to institutionalize it in scaling up a school garden program. Investment in WASH facilities in pilot schools could, though, be justified as part of a VGTS second phase strategy to conduct research on interventions in agriculture, education and sanitation, to understand their cumulative or separate impacts on health outcomes. It is unconvincing to envisage construction of WASH facilities as part of a school garden program that might begin scaling out at the national level merely after another three year phase of VGTS. Not only is building the required new partnerships likely to be overly ambitious, but the scale of needed financial investment to upgrade WASH facilities would so magnify the investment required as to risk making the entire endeavor of out scaling VGTS non-viable to national policy makers. Research on WASH facilities should continue in order to make the case for such investment as a complement to out

scaling VGTS. The WASH component to be out scaled by national authorities as a follow on to VGTS can only plausibly be educational or awareness based. Even this will require stronger links with Health Ministries that have come out of in the first phase of VGTS.

Sustainable institutionalization at the school level will have to face the issue not only of affordably increasing the throughput of teacher training to expand the number of schools with gardens, but it will also have to deal with teacher turnover in schools where gardens have been established. This suggests the desirability of a sustained commitment to training teachers through regularly course. Preferably these would include periodic refresher events to upgrade skills as well as introductory courses for new teachers in the program.

**4.2 Project Management:** VGTS is currently running well. Program management is in the hands of the University of Freiburg while financial management and reporting is with AVRDC which also essentially provides most support to the country teams. Management at the Country Team level seems sound. Despite the currently tranquil situation, however, in the early stages of the first phase there were severe management difficulties.

AVRDC was the driving force conceptualizing the project and putting together the partnerships, so it was naturally chosen as the implementing agency and project manager. From an early stage in project implementation the exercise of these functions was hampered by a lack of consensus within AVRDC about important project issues. In addition, the process of appointment and the performance of the appointed project manager became an issue. At the Country Team level there is a degree of appreciation for the performance of the initial project manager. One country reported that management has actually weakened since the departure of the AVRDC appointed manager, while another reported that management had been reasonably effective if not always tactful. The international partners from University of Freiburg and the Swiss TPH were more critical of the project manager's performance. Sensitive to these difficulties and concerned to make a success of the project SDC raised these and other issues with AVRDC but did not initially receive a satisfactory response.

Ultimately after further dialogue and reflection, AVRDC withdrew from overall programmatic management of VGTS, fired the project manager, and passed most responsibilities for VGTS management to the University of Freiburg while continuing overall financial management and support to the country teams. Although the tensions that arose among the international partners from disagreements early in the project have still not fully dissipated, the project is now running on an even keel with very able senior oversight from Freiburg. Unfortunately the full time project manager contracted by Freiburg had issues that prevented any assumption of responsibilities or execution of any functions.

Freiburg's agreement to assume management responsibilities has brought stability to VGTS and fostered an environment in which significant programmatic progress has been achieved both at the international research level and in garden implementation at the country level. All parties recognize and appreciate Freiburg's contribution in this regard. Nonetheless, it is not clear that Freiburg aspires to continuing in its current project management role, and the Evaluation concurs with Freiburg's caution.

Bringing in new partners to any future phase could be advantageous. At the international level it would be desirable to identify partners with experience in both research and development, and strengths in nutrition, education, and project management would all be assets. It is not clear, though, that a new partner could immediately assume overall leadership for VGTS.

### **4.3 Future Paths for VGTS**

VGTS is an unusually innovative and complex project. Not only does it break new ground in integrating across agriculture, education, nutrition and public health, it also operates across five countries and involves three advanced research institutes.

In its research, VGTS is producing relevant and important results about the effectiveness of school gardens both from the randomized control trials and the WASH case studies, while a functioning on line data warehouse has been developed. In implementing gardens at the country level, VGTS has sparked the formation of capable inter-institutional teams embracing to varying degrees agriculture, education, nutrition and sanitation. VGTS preliminary research results indicate a significant effect of school gardens while at the school level, gardens are prospering in pilot schools where school curricula are being enhanced. These advances have come to the attention of some policy makers.

Thus, overcoming some initial management difficulties, VGTS has been largely successful in meeting the objectives of its first phase. Advances achieved to date, especially at the country level, should be built upon in a second phase rather than abandoned.

The strategy for any second phase needs to recognize that with few exceptions, school gardens alone don't produce enough vegetables to create a lasting increase in student vegetable consumption or to sustain a school feeding program. Consequently school gardens have to be treated principally as an educational instrument and strategies that amplify their effects through linkages to wider community efforts in vegetable production have to be tested.

Institutionalizing school gardens into educational curricula will take different forms in different countries. In some cases there will be opportunities to link

gardens to nutrition and health curricula. In other cases school gardens might be linked to vocational options in agriculture. Either of these might occur at different grade levels although vocational courses may tend to prevail more at upper grades. While the first phase of VGTS was rightly driven from an agricultural perspective to get the gardens established, a second phase needs to involve education decision makers more.

Ultimately school gardens are going to be an endeavor that is embedded in schools, in the education system. Because the first phase of VGTS did not clearly resolve in any of the countries how school gardens can best be institutionalized in the education system, the second phase of VGTS has to address this on a pilot phase, testing different approaches and engaging a commitment for educational decision makers before VGTS can move fully to out scaling. In this process the second phase would scale out to a larger number of schools. In fact that may be an essential aspect of the second phase. Any second phase, though, is still a phase of trial and learning rather than massification of a fully worked out strategy. How best to incorporate school gardens into the educational system, and getting education ministry commitment are important challenges for the second phase. Part of convincing education decision makers may be the generation of further results from the randomized control studies (for example by moving to a multi-year cohort study approach), the WASH case studies, and the Collaborative Research Environment.

In the first phase some progress was made in developing teaching materials to accompany home gardens. Appropriate classroom learning has to accompany practical gardening experience so that the students better absorb information about nutrition and health. To enhance the effectiveness of these teaching materials, they should be further adapted to local conditions. In addition, the nutrition, sanitation and health dimensions of these teaching materials have to be stressed more.

Besides direct knowledge transmission to students, schools can also exert effective leverage to disseminate knowledge and promote learning in the wider community. Some initial ad hoc efforts along these lines have been made in the first phase of VGTS. However, there has not been the systematic effort that would either produce convincing data on how best to foster these wider community linkages or to provide a basis for serious buy in from agencies responsible for wider community development. Indonesia may be especially well placed in this regard since the FSA not only has been the prime mover of school gardens, but also it has a national mandate to promote women's gardening groups.

School gardens can be linked to various home or community garden programs; school feeding programs; or commercial vegetable production. Particularly in locations where there is commercial vegetable production and where agriculture is an option in vocational education, there could be scope to connect learning in

the schools with student semi-commercial projects at home, and the supply of school feeding programs.

Moreover, how best to integrate WASH with school gardens requires further assessment. To some extent this involves changes in the school curriculum, which the Evaluation strongly recommends. Integrating WASH could involve investment in WASH facilities at the school level, though as discussed above there are significant obstacles to this latter approach. It is not clear that any efforts have yet been made through VGTS to link school activities with wider community efforts in public health awareness or activities. What form this might take the Evaluation cannot presume to say, but VGTS might well want to look at these possibilities in the second phase.

It would exceed the brief of an evaluation of the first phase of VGTS to mandate design of a second phase. Nevertheless, it is appropriate to suggest some potential options (see above) and to recommend that in the design of any second phase of VGTS, particular attention should be paid to including the systematic testing of alternative pathways to link school gardens with wider community development. This could well include further phase II research through case studies or other approaches as a prelude of moving more fully towards scaling out in a phase III VGTS.

## **APPENDIX I: LIST OF ACRONYMS**

AVRDC	Asian Vegetable Research & Development Center
CoRRB	Council of Renewable Resources Research, Bhutan
CRE	Collaborative Research Environment
DES	Department of Education and Schools, Bhutan
FSA	Food Security Agency, Indonesia
NARC	National Agricultural Research Center, Nepal
NGO	Non-Governmental Agency
RIHS	Royal Institute of Health Science
SAP	School Agricultural Program, Bhutan
SDC	Swiss Agency for Development and Cooperation
TPHI	Tropical Public Health Institute, Switzerland
UNICEF	United Nations Children's Fund
VGTS	Vegetables Go To School
WASH	Water Sanitation and Hygiene

## **APPENDIX II: SUMMARY OF EVALUATION PROCESS**

### **PREPATORY ACTIVITIES**

Terms of Reference finalized and contract agreed June 9, 2015.

First sets of project documents received from Project Manager (Dr. Axel Drescher) June 30, July 8, 2015.

Draft workplan for the evaluation circulated to VGTS Management Team for comment, July 9, 2015.

Revised workplan for the evaluation submitted to SDC for comment and approval July 22, 2015.

### **TELECONFERENCES**

Axel Drescher (and colleagues) June 25; October 23; November 20, 2015.

Gueladio Cisse July 1; Cisse, Shrestha and Severine November 19, 2015

Ray Yu Yang June 25, 2015.

Carmen Thoennissen July 21; with Marlene Heeb & Peter Bieler November 30; with Drescher, Cisse and Ray Yu December 4, 2015.

### **FIELD VISIT ITINERARY**

#### 2015 October 18-19 DP to visit AVRDC/Taiwan

Meetings with Ray-Yu Yang, nutritionist and point person for VGTS; Greg Luther, Leader Global Technology Dissemination; Pepeijn Schreinemachers, Leader, Impact Assessment; Annelie Oberg, Projects Office; Maureen Mercozzi, Communications; Dyno Keatinge, Director General; Jackie Hughes, Deputy Director General for Research; Abdou Tenkaouno, Regional Director, West Africa; Warwick Easdown, Regional Director, South Asia; Fenton Beed, Regional Director, Southeast Asia; Victor Afari-Sefa Coordinator Global Consumption Theme.

#### 2015 October 21-24 DP & JM field work in Indonesia

Meetings at Food Security Agency: Sri Sulihanti, Director, Consumption and Food Safety Division; Rinna Syawal, VGTS Country Manager,

2015 October 25 DP travel to Bhutan

2015 October 26-30 DP field work in Bhutan

2015 October 31 DP travel to Nepal

2015 November 1-5 DP field work in Nepal

2015 November 10-13 JM field visit to Burkina Faso. Accompanied by Prof Cisse for part of the time.

DP= Douglas Pachico; JM= John Mumba

### APPENDIX III: DOCUMENTS CONSULTED

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## **APPENDIX IV: PROFILES OF EVALUATION PANEL MEMBERS**

Douglas Pachico, the Panel Chair, is a development economist with extensive management experience. He was graduated from Cornell University with a PhD in agricultural economics. His research interests include small farmer production systems and impact assessment, and he is the author of over 20 refereed publications. As a Manager, he was variously Deputy Director of Research at CIAT, Director of Strategic Planning, Director of Natural Resources Research, Head of Impact Assessment, and Leader of the Bean Program. He has been based in Colombia, Nepal, and Turkey, working in research, extension and education. He has overseen projects throughout Latin America, East and Southern Africa, and Southeast Asia. Recently he has undertaken a number of consultancies for CRS in Central America, Liberia and Ethiopia, for the CGIAR Standing Panel on Impact Assessment, and served as the Chair of the External Program and Management Review of AVRDC.

John Mumba, the evaluation team member is a nutritionist working for Netherlands Development Organization (SNV-Zambia). He is a graduate from the University of Zimbabwe with a BSc degree in Nutrition. He has worked in various International NGOs including GOAL Ethiopia as Child Survival Project Manager, World Vision as an Emergency Nutrition manager in Niamey, Niger, Project Manager for Action against Hunger (ACF) in Nigeria. He has also worked for USAID funded projects in Zambia and Irish Aid Funded project under Self Help Africa as Project Supervisor and Food security and Nutrition Officer respectively.