

**FRAMEWORK ON IMPLEMENTING INTEGRATED VECTOR  
MANAGEMENT FOR MALARIA AND VECTOR BORNE  
DISEASE CONTROL AT DISTRICT LEVEL IN  
COUNTRIES OF SEA REGION**

**Synergies between Agriculture and Health towards  
Vector Management - A Case Study of the IPVMM Project  
in Sri Lanka: a Mission Report**

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## **PURPOSE**

The purpose of undertaking the case study of the ongoing IPVM project in Sri Lanka was to identify synergies between agriculture and health to assist WHO/SEARO with the development of a district implementation plan for Integrated Vector Management in the context of WHO/SEARO's revised malaria control strategy and the overall goal to reduce the burden of vector borne diseases in the SEA Region. The case study was conducted between 15 and 19 January 2007 by visiting three of seven active IPVM sites and holding discussions with various stakeholders in the country.

## **BACKGROUND**

### ***Link between Agriculture and Health***

Agriculture and livestock-raising are important subsistence activities in South-East Asia. The link between malaria and irrigation/agriculture development is known for a long time. Rice agro-ecosystems also support vectors of Japanese encephalitis in some countries. Among the main type of farming systems, modern agriculture is dependant on irrigation and inputs of fertilizers and pesticides. Against the wisdom of traditional farming practices, excessive use of pesticides in agriculture has resulted *inter alia* in (a) disturbance in nature's balance between harmful crop pests and the beneficial predators in local ecosystems, (b) increased occupational exposures of farming community and incidence of pesticide poisoning, (c) pesticide residues in food and environment and (d) development of insecticide resistance of mosquito vectors.

### ***Integrated Pest Management***

Realizing the ill effects of excessive dependence on chemical pesticides, experimentations on the Integrated Pest Management (IPM) approach began in the late 1970s in the Philippines. IPM promotes the philosophy of "healthy fields for healthy people" and is a farmer-based agro-ecosystem management approach that uses broadly four principles, i.e., grow a healthy crop using good agricultural practices, conserve natural enemies to reduce the use of chemical pesticides, conduct regular field observations to make timely and evidence-based management decisions, and empower farmers to become experts through a participatory learning approach to deal with local situations.

### ***Farmer Field School Approach***

Over the years, IPM has led to the development of Farmer Field School (FFS) movement with major advancement in Indonesia in the late 1980s<sup>2</sup>. Unlike the traditional farmer education, the FFS is a modern, participatory learning and community empowering approach based on season-long practical demonstration of improved farming practices and to protect the farming community and the agro-ecosystems from the ill effects of pesticide use, thereby aiming to create

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<sup>2</sup> van den Berg, H (2004). IPM Farmer Field Schools: A synthesis of 25 impact evaluations. Report prepared for the Global IPM Facility, Wageningen University, January 2004.

sustainable agriculture and environment. The FFSs, comprising groups of 15-30 farmers, are facilitated by agricultural extension trainers from the land preparation right up to the harvesting stage. Farmers participate in weekly learning cycles throughout the crop-season when they collectively learn to conduct agro-ecosystem analysis (AESA), identify agricultural pests and beneficial predators, and make informed decisions about crop management and use of pesticides. They compare processes and outcomes in the IPM plots with those in the non-IPM plots.

The IPM Farmer Field School approach was applied in rice cultivation in mid-1990s in Asia, later expanded to vegetables, cotton and various other crops in other regions. A wide range of benefits including development impacts have been reported of IPM FFS in a recent evaluation of impact of 25 IPM studies in Asia (Bangladesh, China, Cambodia, Indonesia, Philippines, Sri Lanka, Thailand, Vietnam ) and other regions<sup>2</sup>. India has large IPM programme including the rice IPM.

### ***IPM to IPVM- a Pilot Project in Sri Lanka***

The participatory IPM programme in Sri Lanka started from 1995, expanded after 1999 and studies<sup>3</sup> in 2002 reported that it affected farmer practices resulting in substantial increase in yield and profits from rice cultivation, reduced insecticide use causing savings in agrochemical inputs but no change in herbicide use, incorporation of rice straw to improve physical and biological soil properties, better use of fertilizers, and was found to be cost-effective providing motivation, cooperation and a sense of program ownership to farming communities.

These positive experiences led to the integration of vector management with IPM and an Integrated Pest and Vector Management (IPVM) project was started with Phase-I funding by FAO in 2002, and Phase-II funding by UNEP for the period 2005 to June 2007.<sup>4</sup> The project is being implemented by the Plant Protection Service of the Department of Agriculture of Sri Lanka and the Deputy Director, Plant Protection and seed Certification, Peradeniya is the country IPVM coordinator for the project. FAO Sri Lanka office in Colombo facilitates the project. The Anti Malaria Campaign (AMC) of the Department of Public Health represents the health sector and monitors impact on mosquitoes in some locations depending upon availability of staff. Mahaveli Authority of Sri Lanka also promotes IPVM activities of the project in its irrigation systems in different districts.

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<sup>3</sup> Henk van den Berg H, Senerath H, Amarasinghe H. Participatory IPM in Sri Lanka: a Broad-Scale and an In-Depth Impact Analysis. A Report prepared for the FAO Programme for Community IPM in Asia, Jakarta, 2002.

<sup>4</sup> Pontius J, Dilts R, Bartlett A (eds). *Ten Years of Building Community: From Farmer Field Schools to Community IPM*. FAO Community IPM Programme: Jakarta, 2000.

## **2. IPVM CASE STUDIES**

Among the important components of the IVM strategy are inter-sectoral coordination and community empowerment/participation. The Sri Lankan rice IPVM project operated by agriculture sector offers an opportunity to find out synergies between agriculture and health sector. The project was implemented in 2002 to 2005 at 11 sites having varying numbers of farmers trained in different districts/Mahaveli systems in Sri Lanka. The site selection was based on presence of irrigation, cultivation of rice, low to moderate endemicity of malaria, presence of agriculture extension services, and availability entomological staff under Anti Malaria Campaign (AMC) in the respective district. At present the project is operational at 7 sites (Fig 1) and 4 sites have been discontinued due to various reasons- civil strife, drought, transfer of staff, resource constraints etc.

The writer undertook rapid case studies at three of the functional project locations from 15 to 19 January 2007. Although it is realized that case studies do not yield exhaustive information on the project as a whole compared with an in-depth evaluation, given the fact that a much detailed evaluation of the project was recently undertaken<sup>5</sup>, a focused objective of undertaking the case studies was to directly observe the participatory IPVM learning approach in agriculture, identify possible health synergies toward vector and pesticide management, assess broader development impacts, replicability and sustainability. The main observations are summarized below.

### **2.1 IPVM Site Kiriibbanwewa, Udawalawe System**

Kiriibbanwewa Block is located in Mahaveli Development area. About 1700 h land is under irrigation and main crops grown are pulses and groundnut in upland, whereas rice, sugarcane and banana in low land irrigated area. Insecticides are not sprayed in banana and vegetable crops. In this area, tank irrigation commenced in 1963 under the River valley Development Board. Since 1982, irrigation scheme is under the Mahaveli Development Authority of Sri Lanka.

A FFS started at village Kiriibbanwewa in 2002 as a collaborative programme. Of the 500 farmer families, 70% have been trained and about 470 h rice land is under the IPVM programme. An agriculture extension trainer visits the village every week to facilitate work of the FFS.

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<sup>5</sup> Evaluation Report of the Integrated Pest and Vector Management (IPVM) Project in Sri Lanka- Mission Report", WHO/SEARO, New Delhi, 2006.

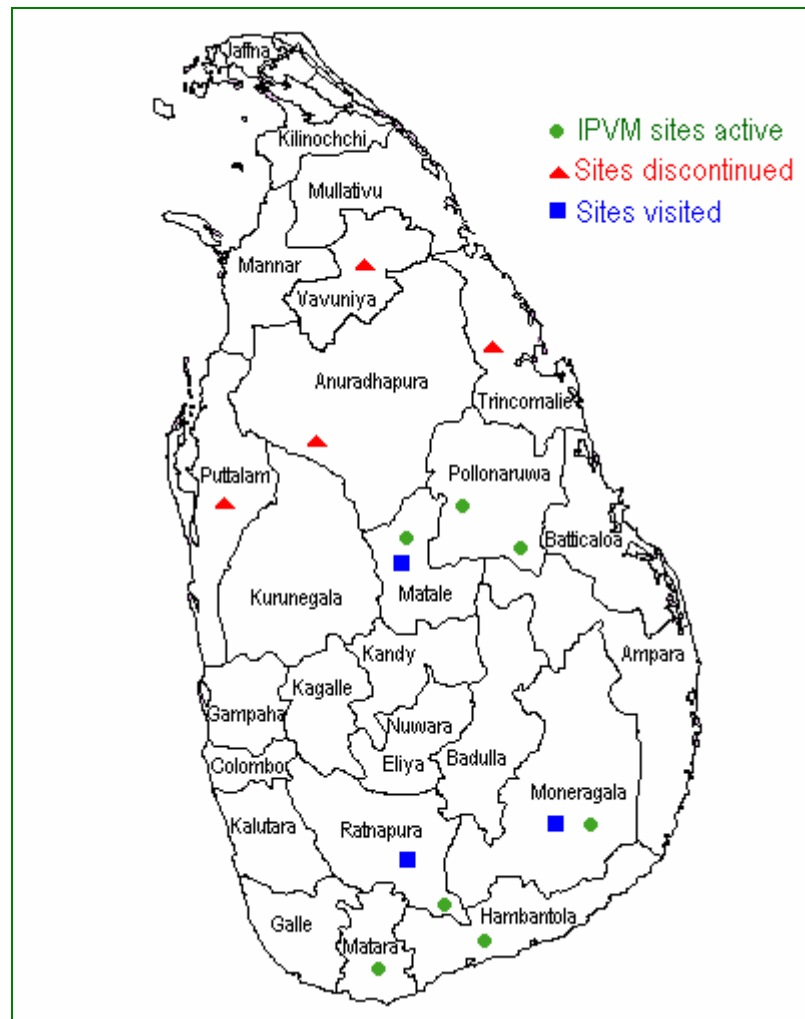


Fig. 1. Map of Sri Lanka showing various districts where IPVM sites are active or visited for the case study, and those that have been discontinued.

The day's work at FFS comprises the following activities:

1. Registration of farmers
2. Welcome by field officer/facilitator
3. Explaining objectives of work
4. Briefing on previous week's activities
5. Data collection in rice plots for agro-ecosystem analysis (AES):
  - Check plant growth observing 10 hills (a hill is a bunch of plants or tillers)
  - Observe attack of fungus, insects/pests on plants
  - Collection of beneficial insects/organisms/pests, mosquito larvae
  - Check water level in field and weather conditions (sun light/cloud, air, rain etc)
  - Plant defoliation experiment in selected plots
6. Drawing
7. Refreshment
8. Group dynamics- food web exercise etc

9. Discussions on special topics and interpretations
10. Based on AES, making decisions on crop management namely use of fertilizers/manure, use of pesticide/herbicide, maintenance of water level
11. Concluding briefing on day's activities

The FFS participants demonstrated the above mentioned activities on the day of visit and how they made informed decisions for better crop management. Women don't participate in farming activities as an exception in this village. General sanitary conditions were remarkably good and literacy rate was reported to be very high. People use mosquito nets but these are not treated. The window curtains were also used in some homes however houses lacked mosquito proofing.

It was noted that the village is located in a rice growing area, and mosquito breeding habitats included rice fields, canals, wells, open cement-tanks, ornamental cisterns, tires and coconut husks. The Anti Malaria Campaign (AMC) staffs participate in FFS IPVM activities and monitor mosquito larval and adult densities regularly. The Regional Malaria Officer, who looked after Monaragala district, along with an Entomologist and a Public health Inspector were present during the field visit and gave lecture on vector management during the proceedings of the FFS. Guppy fish are released in containers and were found present during the visit.

In a nearby IPVM village- Kiriibbanwewa Vamya- a large number of rainwater harvesting tanks called *Vasi Deya* (see photos) have been constructed with financial assistance of the National Water Supply and Drainage Board and some NGOs such as World Vision. The water stored during rains is used for drinking purpose during the dry period of the year when water release in canals is stopped. The design of these tanks is not mosquito proof, although people had tied piece of cloth around the inlet spout and on the top mouth as a temporary measure. Guppy fish were found in household tanks, as well as the uses of mosquito nets in some households.

## **2.2 IPVM Site village Waguruwela, district Monaragala**

In Monaragala district, FFS activity started in 2002. There are 100 farmer families in Waguruwela village, 20% of whom have so far been trained. There are two active women alumni of previous FFS and both men and women participate in FFS. The present rice crop season started in October 2006. The FFS members demonstrated their routine AES work and group dynamics in decision making. The dwelling houses are located in rice fields and are not mosquito proof. Malaria incidence in past few years has remained very low, thus no vector control intervention (IRS/ITNs/Larvivorous) is being undertaken by AMC.

Unlike the participatory process adopted by FFS for agro-ecosystem analysis and crop/pesticide management, the AMC staff from Monaragala demonstrated larvae of mosquitoes and gave lecture on vector management. Therefore, the writer introduced a participatory learning approach by conducting a geographical reconnaissance of larval habitats, disused pesticide and other containers including coconut shells, and use of mosquito nets and the groups of farmers

made drawings for discussions and community actions for vector control (see photo). A large number of glass bottles, some with *Aedes* larvae in rainwater trapped inside, and pesticide containers were found. People use mosquito nets but these were not treated, nor did the people know about treatment as a procedure. There was no use of larvivorous fish in this village.

### **2.3 IPVM Site village Lenadora, district Matale**

A new FFS was started in 2005 in village Lenadora where 350 farmer families live in. Already 100 farmers, both men and women, have been trained in rice IPVM and 15 more are enrolled for training for the 2006-07 crop-season, which is of about 3 ½ months period. Farmers have grown BG 352 variety of rice. Activities of the FFS such as agro-ecosystem analysis, group dynamics, interpretation of results and decision making process were observed. The agriculture extension service personnel were present.

It was informed that prevalence of malaria was high in the village 10 years back. In 2006 though, only a few cases of malaria occurred. Some cases of leptospirosis also occurred. The vector control activities of the Anti Malaria Campaign were not clearly visible in this village. Dwelling houses were located amid rice fields and were not mosquito proof. Use of mosquito nets was low.

### **2.4 Discussions with stakeholders**

During the case study, discussions were held with a number of stakeholders such the personnel of the central department of agriculture at Kandy, provincial department of agriculture in Matale, Mahaveli Authority staff at Kiriibbanwewa, Regional Malaria staff, and Director of AMC, FAO representative and his staff and WHO NPO in Colombo.

## **3. MAIN FINDINGS**

- The Farmer Field School has been found as a participatory, community empowering approach to implement good agriculture practice by farming communities in rural Sri Lanka;
- FFS IPVM has been successful in creating community action for local problems.
- Farmers have realized a number of benefits of the new approach compared with traditional farming- savings on pesticide expenditure, less exposure with agriculture insecticides, less dependence on chemical fertilizers;
- It was observed that alternate dry and wet cultivation does enhance root respiration and is useful for rice crop. It was though was not generally preferred because farmers liked to maintain high water level in fields to check growth of weed since manual weeding was not feasible due to shortage of farm labour. This area needs further attention.

- So far the IPVM experience has been limited to rice crop in Sri Lanka although other crops are grown in different districts.
- The AMC so far is a unified campaign and has not yet integrated as an integrated Vector Borne Disease control programme.
- AMC has not been able to fully integrate with IPVM project at all sites due to various reasons- the main being resource constraints and lack of trained entomological staff. Wherever AMC staff has been actively involved in FFS activities, farmers have developed skills in identifying mosquitoes and are inclined to participate in undertaking interventions against mosquito-borne diseases prevalent in the countryside.
- At some locations, the project has led to the use of guppy fish, mosquito proofing of water storage tanks, use of mosquito nets as well as willingness to undertake sanitation around the houses.
- Entomological monitoring since early wetland rice crop season indicates that mosquito population builds up during the initial 6 weeks period of flooding the rice field.
- IPVM activities were found to be more effective in reducing mosquito nuisance during the short rainy season than the long rainy season. Malaria incidence was low, and data were not considered.
- IPVM approach has led to reduction in use of insecticides but not of herbicides. The indirect gains- not evaluated so far- are likely to be less occupational exposures to pesticides and incidence of food poisoning.
- Used pesticide containers are often stacked in the neighbourhoods and pose health and environmental risk. Their safe disposal is very important.
- The anticipated effect of reduction in pesticide use on mosquito resistance is not evaluated.
- FFS IPVM training offers opportunity to educate the farming community of various health risks, namely occupational exposures with pesticides, contamination of food and environment, and mosquito-borne diseases and other water-related diseases (e.g. Leptospirosis in Sri Lanka).
- It is reported that the recurrent costs of training farmers in IPVM through FFS approach during a season long training are approximately US \$10 per graduated farmer.
- A more scientific evaluation of the project, and in particular for health impact assessment, is so far lacking although interim evaluations have brought out several positive gains.

**In conclusion**, the FFS IPVM approach in Sri Lanka has shown that it not only empowers communities to make observation-based decisions to grow healthy crops but provides an excellent entry route for promoting health and community

well being, in particular for the control of vector borne diseases through community action at grass-roots level.

#### **4. RECOMMENDATIONS**

- So far the project has been implemented on a village scale at about a dozen locations scattered all over the country in wetland rice. In the next phase of extension, considerations may be given by moving from a pilot project mode to programme by expanding the IPVM on a larger scale in a district with low to intermediate malaria endemicity. This will create better functional and programmatic synergy with district level AMC and lead to institutionalization of the approach.
- IPVM should move from wetland rice to include other representative crop practices- e.g. vegetables;
- A detailed scientific and cost-effectiveness evaluation of the project, and in particularly for health impact assessment, may be undertaken to convince the policy makers to make larger resource allocations for expansion and sustainability;
- Since rice crop is irrigation dependant and there have instances of drought disrupting IPM activities in some locations. Therefore, it is necessary to promote other income generating schemes as were also suggested by an earlier WHO Mission in June 2006;
- Given the history of serious malaria outbreaks in Sri Lanka in the past, the motivated and trained farming community can supplement vector and vector borne disease surveillance at local level for initiating local action in case of disease outbreaks or natural disasters
- The AMC has not been able to fully integrate with IPM activities everywhere. The Regional Malaria Officers come from varying specialties and not all are entomologists. One of the important reasons is low entomological and IPVM programme capacity at district level, which need strengthening. There is a need to further enhance convergence between agriculture and AMC.
- There is concern for sustainability of IPVM project once current funding support ends. Therefore, there is a need for a policy change toward IPM/IPVM at central level. This in turn will require holding consultations with higher levels in related ministries/ programmes and stakeholders and organizing a national level workshop for dissemination of results and how to move forward.

## Annex 1 Itinerary

Date	Activity
14 January 2007	<ul style="list-style-type: none"> <li>▪ Departure from India; arrival in Colombo; travel to Kandy</li> </ul>
15 January 2007	<ul style="list-style-type: none"> <li>▪ Meeting with Deputy Director and other staff, Plant Protection Service, Plant Protection and Seed Certification, Department of Agriculture, Peradeniya</li> </ul>
16 January 2007	<ul style="list-style-type: none"> <li>▪ AM: Visit IPVM site in village Lenadora, district Matale with officials of Plant Protection Office (Peradeniya) and agriculture Extension Service (Matale)</li> <li>▪ Participate in ongoing Farmer Field School activities; discussion with stakeholders</li> <li>▪ PM: Travel to Embilipitiya</li> </ul>
17 January 2007	<ul style="list-style-type: none"> <li>▪ AM: Visit IPVM site in village Kiriibbanwewa, district Ratnapura</li> <li>▪ Participate in ongoing Farmer Field School activities; discussion with stakeholders</li> <li>▪ Discussions with Anti Malaria Campaign officials at IPVM site; observe anti-malaria interventions in Kiriibbanwewa and Kiriibbanwewa-Vamya villages</li> <li>▪ PM: Travel to Embilipitiya</li> <li>▪ Meeting with Regional Malaria Officer, Embilipitiya</li> </ul>
18 January 2007	<ul style="list-style-type: none"> <li>▪ AM: Visit IPVM site in village Waguruwela, Ratrankanatra Tract, district Monaragala and participate in ongoing Farmer Field School activities</li> <li>▪ Discussions with Anti Malaria Campaign officials of Monaragala district at IPVM site; organize mosquito survey and situation analysis, discussion with stakeholders</li> <li>▪ PM: Travel to Colombo</li> </ul>
19 January 2007	<ul style="list-style-type: none"> <li>▪ Meeting with Director, Anti Malaria Campaign</li> <li>▪ Meeting with NPO Communicable Diseases, WHO Country Office</li> <li>▪ Meetings with FAO Country Representative and Programme Associate</li> </ul>
20 January 2007	<ul style="list-style-type: none"> <li>▪ AM Depart Colombo and arrival in India</li> </ul>

## Annex 2 Persons met

<b>Name</b>	<b>Affiliation/address</b>	<b>Contact details</b>
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Dr Supriya W.	National Professional Officer Communicable Diseases, World Health Organization, Colombo, Sri Lanka	
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Mr. Priyanta Weersurya	Subject Matter Officer, Plant Protection, District Agriculture Extension Office, Matale	
Mr. Prasanna Pallemulla	Deputy Director, District Agriculture Extension Office, Matale, Sri Lanka	
Ms. PAD Mallawa	Subject Matter Officer, Segment Office, Dambulla, District Agriculture Extension Office, Matale, Sri Lanka	
Mr. Wimala Sekara	Agriculture Officer, Mahaveli Development Project, Kiribbanwewa, Sri Lanka	
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Mr HSB Dishanayake	Public Health Inspector, Regional Malaria Office, Anti Malaria Campaign, Monaragala, Sri Lanka	
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Mr RM Ratnapala	Village level facilitator, Village Waguruwela, District Monaragala, Sri Lanka	
Ms Nanda Jayasundara	FFS Alumni, Village Waguruwela, District Monaragala, Sri Lanka	

**Annex 3** Photographs of IPVM activities in Sri Lanka and discussions with stakeholders



Farmers assisted by agriculture trainers collecting beneficial insects and pests in an IPVM plot in village Lenadora, district Matale



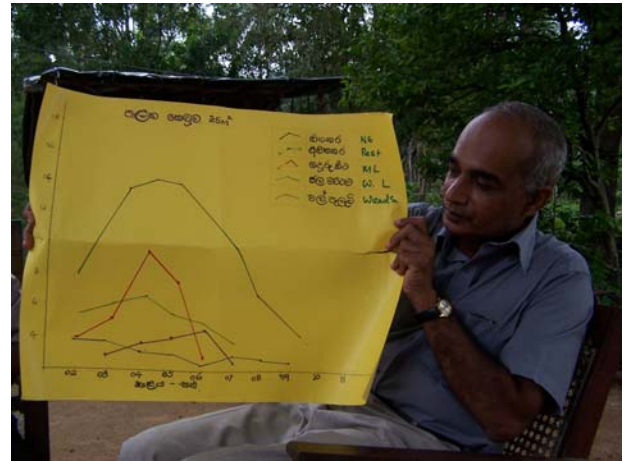
Farmers demonstrate agro-ecosystem analysis, Lenadora



Plant defoliation experiment in an IPVM plot, village Kiribbanwewa



Preparing drawing on agro-ecosystem analysis for discussion



A chart showing mosquito and pest populations in relation to rice plant growth and water level



A farmer discussing agro-ecosystem analysis using a drawing in village Waguruwela, Monaragala



Participatory learning is a part of routine activity at Farmer Field School. Farmers make their own decisions about crop and pest management based on weekly observations



A Public Health Inspector participating in search of mosquito breeding habitats and containers; Waguruwela



An Entomologist discussing results of search of mosquito breeding habitats by farming community and the use of mosquito nets



A Farmer Field School alumni displaying a drawing of mosquito breeding habitats around the dwelling houses as a new exercise introduced by the writer in Waguruwela on the line of agro-ecosystem analysis.

**Various types of mosquito breeding habitats:**



Some intervention activities being sustained by community:



A rainwater harvesting

tank (*Vasi diye*) with inlet covered with a cloth. Such tanks are being built with assistance from NGOs in areas receiving low rainfall



Many households use mosquito nets and window curtains



Use of larvivorous fish *Tilapia (Oreochromis)* or guppies (*Poecilia*) in tanks for mosquito control has been accepted by the community; village Kiribbanwewa Vama.