Larval Source Management (LSM) for VBDs in Pakistan
Nuisance mosquitoes in Pakistan

*Culex quinquefasciatus*
*Culex tritaeniorhyncus*
National V/C Guidelines and Strategy

Dist. Zhob

Planning Period

Larviciding

IRS

Peak Transmission

Axis Title

EM & EM

Name of the Event, followed by the date
Larval Source Management (LSM): *Rationale*

**Malaria**

- Supplementary to IRS and LLINs

- Limited & Fix breeding sites
  - Fish ponds
  - Water Tanks
  - Water-courses
  - Irrigated fields

- *An. culicifacies* and *An. stephensi* are susceptible
Larval Source Management (LSM): *Rationale*

**Dengue**
- Made-made domestic (drinking water habitats)
- Mostly inside the houses
  - Ungrounded water tanks
  - Earthen pots
  - Drums
  - Discarded containers
Larval Source Management (LSM) in Pakistan

Management of all potential breeding sites to prevents/minimizes the vector breeding and hence reduces human-vector contact and transmission risk.

Methods of LSM in Pakistan

LSM is part of national V/C strategy and guidelines which focuses:

- Larviciding
- Environmental Management (EM)
  - Habitat modification
  - Habitat manipulation,
- Biological control
National Vector Control Guidelines

• Larviciding should be done during “Dry months i.e. May & June” breeding sites are “Limited, easily Recognizable, Accessible & Manageable”

• Larviciding should be carried out very carefully;
  ➢ Proper Breeding Sites Assessment Surveys (BSAS) and mapping
  ➢ Specifically after the evaluation of resistance level against in-use Larvicide(s)
  ➢ At site where proper target life-stage of mosquito larvae are present.

• For most efficient larviciding program, treatments must be;
  ➢ Repeated at fairly short cycles (7-10 days & 3-4 cycles/month).
  ➢ Carrier out for at least 2 M for both nuisance and vector mosquitoes.
National Vector Control Guidelines

• Currently used larvicides are;

<table>
<thead>
<tr>
<th>Larvicides</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temephos</td>
<td>Malaria</td>
</tr>
<tr>
<td>Fenthion</td>
<td>DENGUE</td>
</tr>
<tr>
<td>Pyriproxyfen (Sumilarv 0.5G)</td>
<td>DENGUE</td>
</tr>
<tr>
<td>Methoperene</td>
<td>DENGUE</td>
</tr>
<tr>
<td>Diflubenzuron (IGR)</td>
<td></td>
</tr>
<tr>
<td>Bacillus Thuringiensesis (B.t.i), B. israelensis (B.s)</td>
<td></td>
</tr>
</tbody>
</table>
Successful stories of LSM in Pakistan
Environmental management of WWSPs.

Experimental Ponds

MATURATION  
FACULTATIVE PONDS

ANAEROIC PONDS.D WW.

Controlled Ponds
CONTROL PONDS

Intervention No: Removal of grasses

UDS 40,000/cycle
INTERVENTION NO. 1
ENVIRONMENTAL MANAGEMENT

• Removal of emergent vegetation
• Repairing of slanting walls (if broken)
Intervention No 1: Removal of grasses
Name of the Event, followed by the date

INTERVENTION NO. 2: MAINTENANCE OF WFR

26-28 days

40-46 days
Name of the Event, followed by the date

Intervention No 2: Maintenance of flow rate
EXPERIMENTAL PONDS

I think I have done it!!!!!!!
## VECTOR DENSITIES IN WSPs (2006 & 2007)

<table>
<thead>
<tr>
<th>Species</th>
<th>Anaerobic P</th>
<th>Facultative P</th>
<th>Maturation P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Experimen</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>(n=234)</td>
<td>(n=156)</td>
<td>(n=78)</td>
</tr>
<tr>
<td>An. stephensi</td>
<td>0.4</td>
<td>9.6</td>
<td>7.7</td>
</tr>
<tr>
<td>An. subpictus</td>
<td>27.0</td>
<td>6.4</td>
<td>5.1</td>
</tr>
<tr>
<td>An. culicifacies</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total anophe. (21829)</td>
<td>27.4</td>
<td>0.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Cx. Quinquefasciatus</td>
<td>51.2</td>
<td>7.7</td>
<td>2.1</td>
</tr>
<tr>
<td>Cx. tritaeniorhynchus</td>
<td>24.8</td>
<td>18</td>
<td>10.3</td>
</tr>
<tr>
<td>Cx. pipiens</td>
<td>35.5</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Cx. pseudovishnui</td>
<td>1.2</td>
<td>11.5</td>
<td>9.3</td>
</tr>
<tr>
<td>Cx. bitaeniorhynchus</td>
<td>0</td>
<td>1.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Total culex (277393)</td>
<td>51.7</td>
<td>0</td>
<td>19.2</td>
</tr>
<tr>
<td>Total Mosquitoes (299222)</td>
<td>52.2</td>
<td>0</td>
<td>19.9</td>
</tr>
</tbody>
</table>
Since 2005, in Pakistan, dengue is the fastest emerging arboviral infection. Lack of inter-sectoral coordination, planning, trained human resources, surveillance systems and effective monitoring and evaluation are the major current challenges to designing evidence-based, cost-effective, community-friendly and sustainable dengue vector control strategies. In 2011/12, IVM strategies were optimally implemented in Pakistan, particularly in the Punjab province, which proved outstandingly successful in controlling dengue fever and dengue hemorrhagic fever (DF/DHF).
Law & Dengue Control in Punjab

Legislation: Govt. Of Punjab framed a comprehensive legislative entitled “The Punjab Prevention and Control of Dengue Regulations, 2011” which focuses all areas of Environmental Management (LSM) which include:

- Ban on old tyre business (storage at open places)
- Ban on all water habitats at public places
- Discourage water storage practices

This was done through:

- Inter-sectoral coordination,
- Community participation,
- Empowering local authorities and finally,
- Big penalty in case of failure in following the legislation.
Conclusion

Larviciding (use of chemicals) still priority, particularly for MALARIA. However, LSM (EM), also demonstrated its strong potential for sustainable management of VBDs in Pakistan.

Outstanding success for dengue control during 2012 in the Punjab demonstrated that IVM is the only and best way forward to control dengue in a sustainable way.