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Traps have proved extremely effective when used on a community-wide basis



Some of the rat tails collected during an outbreak in Chittagong Hill Tract

Battling rodents in Bangladesh

Can pest controllers in the UK learn anything from an ambitious rodent control programme being rolled out in Bangladesh? Surprising perhaps, despite the huge differences in income levels, culture and geographic conditions, when it comes to rodent control there are plenty of similarities between the two countries and, yes, even some useful lessons for pesties in this country too.

The scale of the rodent problem in rural Bangladesh is enormous; far bigger than anything UK pest controllers are ever likely to come across, but the same principles of knowing your enemy, integrating your control methods and, perhaps most important of all, gaining the commitment of the people on the ground, still apply.

Steven Belmain from the University of Greenwich's Natural Resources Institute is one of the UK experts involved in the Bangladesh rodent management project which is being funded by the British government through the Department for International Development's (DIFID) Research Into Use Programme. "The recently elected British government is awash with community action policies to tackle the social ills blighting *Broken Britain* as part of its *Big Society* approach," says Steve. "Interestingly this project on rodent management in Bangladesh has some important lessons for community action projects in both countries. We found that the community-based rodent management action we used actually helps strengthen the community and encouraged the people to tackle other social problems they face."

But, let's get back to the pest control. What

did the researchers find when they first went out to Bangladesh eight years ago.

Bangladesh is a country well used to social problems, often caused by sudden catastrophic events. Rising sea levels, monsoon floods, and cyclones can have dramatic consequences for the world's most densely populated nation. The country's location on the alluvial floodplain basin of the Ganges and Brahmaputra River Delta in South Asia makes for a fertile land. Almost 70% is under active cultivation, with more than 50% of the nation's 160 million people predominantly involved in agriculturally based livelihoods.

A major farm pest

"In this context, it should perhaps come as no surprise that rodents are a major agricultural pest," says Steve. "Our early research was very much focussed on understanding the local ecology and the problems caused by rats."

Much of this work was done in a few villages in the districts of Comilla and Feni, south east of the country's capital, Dhaka. Rat traps were set in different habitats, e.g. rice fields, villages, houses, scrub land, forested areas, to understand what species of rodent could be found, their breeding rates and how they utilised the environment.

"Understanding the local context of the rodent problem and the damage being caused is what good rodent management is all about, whether you're in the UK or Bangladesh," says Steve. "In Bangladesh, rodent damage levels are extremely high. Not only are crops suffering chronic damage and lower yields (routine losses are 5-15%), few houses are rodent proof, meaning that rodents readily enter houses, biting people while they are sleeping, eating and contaminating stored food and undoubtedly transmitting many serious endemic diseases such as typhus and leptospirosis."

The next phase of the research



Why the trapping strategy was chosen

- Rural farmers generally do not understand the difference between acute and chronic poisons, invariably choosing acute because they see dead rodents the next day. Nor do they appreciate how behavioural resistance to acute poisons can develop.
- Rodenticides are relatively expensive for these farming households and they lack the training to use them safely and effectively.
- Kill trap efficacy inside was very high (50-70% per trap night).
- It is the women who are in charge of household activities, including rodent management and they (as opposed to the men who are in charge of rodent management in the field) were easier to bring together for community-wide action.
- Kill traps are more cost-beneficial than rodenticides when measured in the number of rats killed per unit cost, particularly as traps can last many years.
- Daily trapping may be labour intensive, but this is more affordable in developing countries in comparison to regular rodenticide purchases.

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attempted to synthesise what had been learned about the rats, the environment and the damage to people's livelihoods.

The main rodent species causing damage were identified as *Bandicota bengalensis*, *Bandicota indica*, *Rattus rattus*, *Rattus exulans*, and several species of *Mus*, most notably *M. musculus* and *M. tericolor*. The Asian shrew, *Suncus murinus*, is also widely considered a pest for its role in transmitting the disease leptospirosis as well as household-level damage such as eating chicks and eggs.

Rural farming communities in Bangladesh tend to be arranged as compact villages which are surrounded by rice fields. Farm size is very small, with household plots measuring much less than one hectare on which farmers try to grow three crops a year. Thus fallow periods are generally short (1-3 months during the monsoon), and agricultural land is a mosaic of fields owned by different farmers.

Villages become hotspots

"When put in terms of rodent management, this agro-ecological situation found in Bangladesh has several implications," he explains. "First, rodent breeding is nearly continuous throughout the year. Small farm size also means that rodent control actions by any single farmer are virtually useless. Another important outcome is that the monsoon season reduces harbourage opportunities by putting large parts of the country under water. Our research shows that villages become hotspots for rodent activity during the monsoon as the only place that rodents can find a place to live. However, even outside the monsoon season, rural villages have very high numbers of rodents because each household stores their harvested rice inside non-rodent-proof containers. Using two kill traps set each night in a typical rural house can yield more than 100 rats in a month," he adds.

All this information was used to develop a rodent management strategy based on intensive daily kill trapping inside households.

Such a management strategy is in stark contrast to rodent management in developed countries, where farms are generally much larger and labour costs are much higher, making rodenticide use the cost-beneficial option.

So did it work? The short answer is, YES. Village-wide kill trapping on a daily basis was shown to reduce the rat population by more than 80% within two months, particularly when it was carried out during the monsoon season which naturally prevents inward migration. As an additional benefit, reducing the rat population in the village during the monsoon means that there are fewer animals available to re-colonise the fields when the flood waters subside.

Rolling out the programme

Since developing this successful management strategy the research programme has concentrated on scaling up its activities to try to reach as many communities across the country as possible. "By mid-2011 we expect to have trained 20,000 farmers spread across five districts," says Steve. "Our monitoring of community-based rodent management in Bangladesh has shown it to be remarkably robust and effective in different

regions across the country. The benefits are clear with food loss, structural damage and contamination of stored food all being prevented. There is also a halo effect of village-based control on the surrounding rice fields which suffer less damage.



Bandicota bengalensis, one of the main rodent species causing damage

"What is most promising is that the large majority of communities continue to apply what they have learned long after our training and demonstration activities have ended. Follow-up visits one year later, show that about 70% of communities are still actively trapping. We are trying to get to the bottom of why 30% of communities stop, but so far there doesn't seem to be a single reason for this and often the reasons are quite complex.

The biggest challenges in rolling out intensive household trapping as a rodent management solution in Bangladesh are that it needs good community cooperation and that people generally need to observe the results first-hand before they are willing to "buy in" and invest their own money in its operation.

"If there are too many 'freeloaders', who do not trap themselves, the system breaks down. However, we can overcome these problems through training and by helping a community develop organisational and communication structures. Communities can be brought together in a common cause, e.g. rodent pests which everyone suffers from. We have observed that this approach actually helps strengthen the community to tackle other social problems. Community action clearly works best when there are common problems and the solutions benefit everyone. However, once that spirit of community action has been developed, it seems there is no stopping a community from taking charge."

There's more about this project at www.nri.org/bandicoot



Women are key to the success of the strategy. They are in charge of household management and were easier to bring together for community-wide action