In Malaysia the Malaysian Agricultural Research and Development Institute injected carp, and the carp were soon spawning every month of the year. Researchers in Asia are now attempting to produce the gonadotropin from fish closer to home. They have found, not surprisingly, that carp injected with extracts from carp reproduce more than those injected with extracts from salmon.

The IDRC is also involved in other aspects of fish farming. In Africa the problem is the opposite of that in Asia — *tilapia* breed prolifically and overcrowd their ponds, preventing the fry from developing beyond a certain size. In Kenya a project is trying to develop a non-reproducing *tilapia* hybrid, which would be removed from the natal ponds and grow into a larger, marketable fish.

In Thailand, rice is traditionally piled beside the road. IDRC aided programs are developing methods to reduce losses.

Feeding the fry after they have spawned and absorbed their yolk sacs presents another problem. A small project at the University of Victoria found that carp, like cattle, can digest cellulose and inorganic nitrogen, a promising start toward developing cheap feed. In the future carp may be put out to pasture.

Biogas Plants

Farmers in developing countries often use cow dung for fuel. They lack adequate sanitation, and in disposing of waste, contaminate their water supplies. They may also not have enough fertilizer for their crops.

Farmers in Asia attack all three problems by converting animal and plant waste to a biogas mixture of methane and carbon dioxide. There are more than 8,000 biogas plants in China, 36,000 in India and 27,000 in Korea.

The process is simple. The waste — animal dung, human waste and inedible vegetation — is mixed with water and left in a large chamber, partly underground. The waste decomposes, taking some 30 to 50 days and producing the biogas, which is stored in a drum and drawn off as needed. The slurry that remains makes an excellent fertilizer.

The widespread use of biogas is fairly new. The first plants in India were built in 1951, but 70 per cent of those now in use were built during the 1975-76 energy crisis. The IDRC commissioned a state-of-the-art review in 1977 and found that reliable designs for biogas plants were available, but poor construction had resulted in many failures. It found that little attention had been paid to burner and appliance efficiency, which were generally inadequate.

The researchers concluded that current designs may produce plants that are more expensive than they need to be. Large, community plants are likely to be most cost effective, and while the economics of biogas production depend on the particular environment, it may be successfully produced in many more rural areas.