

for which there is no surplus and no acreage restriction, and which actually improves the land for arable crops. Even in its present state of development, fish farming can be profitable, yielding in some instances gross income and net profits exceeding that of rice. In addition, it is a natural addition to the cultural practices used in rice-soybean farming, introducing a rice-fish-soybean rotation program.

Interesting and possibly far-reaching tests are in progress at the Bureau of Sport Fisheries and Wildlife station in Arkansas, in cooperation with the agricultural experiment stations of the University of Arkansas—Department of Agriculture. The tests, which already look promising, involve fish-rice rotations. When rice is planted following a fish harvest, the ground already is leveled, is weedless without application of herbicides, and has been nitrogen-enriched by the fish. New varieties of short, strong-stemmed rice should give considerably larger yields per acre, perhaps as much as 120 bushels compared with a usual 80 or 90.

A conservative estimate of production of channel catfish is 15 million pounds, worth more than \$6 million, plus an additional \$1 million worth of fingerling catfish. Gross income from bait minnow production in Arkansas has not been studied in detail, but we know it exceeds returns from catfish several fold. In Lonoke County, Arkansas, the income from 10,000 acres of fish in 1965 was estimated at \$4 million while the income from 110,000 acres of soybeans grossed only \$6 million. In Arkansas alone there are 3.5 million acres of land that could be used for fish farming. If about 10,000 acres of catfish brought a return of \$6 million last year, the potential income from 3.5 million acres is staggering. Production of channel catfish in 1965 was reported to average 1,600 pounds per acre and to gross between 35 and 50 cents per pound. Production costs were 25 to 30 cents per pound.

Although present production is only a fraction of potential pond fish acreage, it is increasing at a rate of only 10% annually. Producers and new investors add catfish acreage because of relatively high prices obtained for this species from *live fish markets*. Most future production increases, however, must be sold as conventional food fishery products at far less than live fish prices. To assure adequate profits under these conditions, close attention must be paid to quality and efficiency through all phases of production: culture, harvesting, handling, processing, storage, transportation, and marketing.

The natural habitat and man-made impoundments over 1,000 acres in size which produce commercial species of fish in the Missouri River basin total only 2,267,000 acres and yield less than 3 million pounds of fish (that is, 1 pound per acre) with a value well under \$1 million. The possibility of increasing the natural fishery is limited, owing in part to pollution, siltation, and destruction of habitat. The prospect for farm ponds in the south-central states is limited only by technological development and the enterprise of the farmer.

Knowledge in the field of fish husbandry has progressed to a point where desirable fishes can be produced at a favorable profit margin. Research at the Stuttgart and Marion stations has successfully surmounted many of the problems that faced the pioneer fish farmer. Research on spawning, care, and rearing of fry and fingerlings; disease control; supplemental feeds; feeding methods; stocking rates; water management; and general fish-cultural procedures is sufficiently advanced that a beginning fish farmer can enter the field and find a ready source of information to help him learn the techniques that are needed in fish farming. This is not to say that knowledge needed is complete; rather, it is intended to show that research has paid off handsomely in the 5 years that directed studies have been underway on the problems of fish farming.

In one county in Arkansas, the farmer-owned Production Credit Association made \$2 million in loans for fish farming in 1967. This is 25% of the amount loaned for rice farming and 10% of the Association's total business. The fish farming loans are made without security because in that county the *average* fish farmer is realizing a *net* return of \$300 per acre.

Needs (and problem areas)

Catfish farming is growing. In areas needing new industry and employment, expansion of fish farming will create job opportunities. While Mississippi and Arkansas are the present center of production, other states are expected to benefit from the introduction of fish farming. The unskilled, the semiskilled, and those dependent on seasonal agricultural employment—a high percentage of which are minority group members—will be particularly assisted by the