

The Chinese Alligator hope?

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In *Oryx*, October 1981, Huang Chu-chien described the serious plight of China's endemic alligator which had disappeared from most of its historic range and had been listed as a First Class Protected Animal. Earlier that year the author had joined him and other scientists to make a more complete study of the animal, to which fFPS contributed £100. The results of the study suggest that the alligator will perhaps only continue to exist in the wild for a few more years. The main hope for their conservation lies in alligator farming.

In response to reports suggesting that the Chinese alligator *Alligator sinensis* was nearing extinction (Anon., 1980; Huang, 1982) a co-operative Chinese-US study was initiated in 1981 and carried out by Mr Huang Chu-chien of the Institute of Zoology, Chinese Academy of Sciences, Beijing; Mr Chen Bihui of Anhui Teacher's University; and the author, who returned to the US in July 1981. Mr Huang continued the study in 1982 with Professor Shi Yingxian of the Institute of Developmental Biology, Chinese Academy of Sciences, Beijing.

The study had wide-ranging goals but here are presented only those aspects relevant to the habitat survey, the status of alligator populations and the conservation measures that are being and need to be taken.

The range of the Chinese alligator has contracted from approximately 345,000 sq km to approximately 25,000 sq km (Huang, 1981) and covers

parts of only three provinces: Anhui, Zhejiang and Jiangsu (IUCN, 1982). Our study area covered approximately 2800 sq km and within it we visited seven communes, four frequently, including one which had no naturally occurring wild alligators but was maintained as an alligator farm.

Two major habitat types were seen. Communes in low-lying areas (Shipu, Donghe and Hanting) had dense human populations and were intensively cultivated for rice, wheat and safflower with small amounts of vegetable farming. Here alligators lived in irrigation ponds or in rice paddies. Some ponds were no larger than a rice paddy square while others snaked through villages for as much as a third of a kilometre, but none were part of any contiguous bodies of water. The second habitat type was seen at Yishan Commune in the mountain foothills which was, in the main, a tree farm although rice, wheat and vegetables were also grown. The human population was less dense and the alligators lived in isolated reservoirs at elevations below 100 m. Yanglin Commune had both densely populated agricultural and less densely populated forested elevated habitats. No river habitats were visited as my colleagues insisted that most riverine populations of alligators were drowned in floods in 1957 and the few animals remaining were nearly impossible to locate.

The census techniques included day and night observation of study sites, interviews with local inhabitants and the use of *Landsat* remote sensing imagery to analyse environmental characteristics. We started the survey in early May, shortly after the alligators emerge from hibernation. Alligators bask during the day in May

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or: is farming the last

but become more nocturnal as temperatures increase in June. Children throw stones and other objects at basking animals, especially at young ones, causing them to seek the protection of their dens or overhanging vegetation. Animals in the less populous, higher altitude regions were disturbed less but domestic water buffalo and their riders bathing near the reservoir banks adjacent to basking sites would send them to the safety of their dens, often dug into small hillocks several metres distant from the reservoirs themselves.

By early June the Xuancheng region was in the midst of drought; water levels in ponds and reservoirs were so low that entrances to alligator dens built into the banks were clearly exposed. We located alligators by following footprints from dry reservoir beds to den entrances, which were sometimes as far as 50 m from the reservoir's edge at high water. The discovery of partially or completely excavated dens, along with conversations with local people made it clear that alligators are frequently captured. Many captured animals are senselessly killed. Others are taken for possible sale to unscrupulous dealers who attempt to sell them to local zoos or to the alligator farm in Xuancheng. To the best of my knowledge they are not being used for food or skins. It is also possible that the taking of alligators is a socially condoned leisure activity.

Census results

From our preliminary census at six communes we concluded that there were 63 known animals. Of these, we saw 26, and relied on local reports and physical evidence (tail drags, footprints, etc.) as proof of the existence of the rest. Eighteen were adults and 24 were immature but age-size

The Chinese alligator

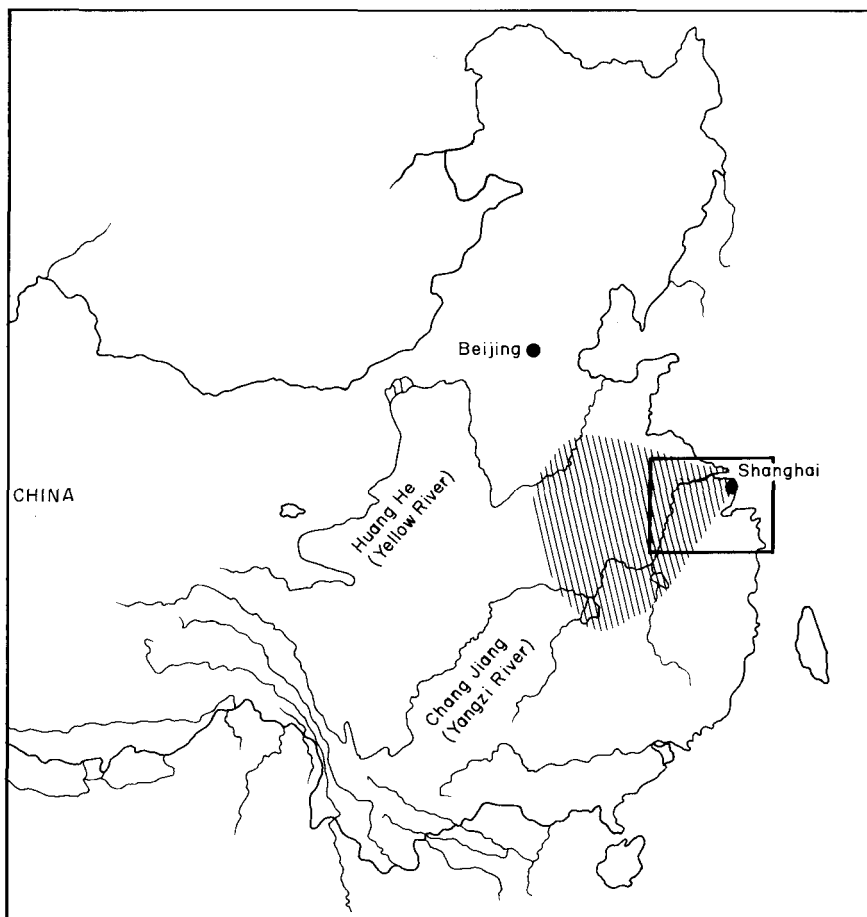


Chinese alligator in a concrete pool (which has been drained prior to resurfacing) at Xiadu Tree Farm Alligator Farm, Xuancheng (*Myrna E. Watanabe*).

classification for the others was either unreliable or unavailable. By the end of July the alligator farm had 89 animals: all but one were adults. Although some of these may have been included in our wild count, capture data suggest that the overlap was only for one or two animals. It is thus apparent that the local residents know where to find the alligators, and that significantly more animals existed in the wild than we counted. It is possible that we did not census some of the areas from which these animals originated, as both time and accessibility problems limited us to a few of the most convenient areas.

Use of *Landsat* imagery

Analysis of *Landsat* remote sensing imagery in conjunction with site visits and information from local scientists gives a much clearer view of the situation regarding the population status of *A. sinensis*. The older literature as cited by Zhang and Huang (1979) indicates that rivers and



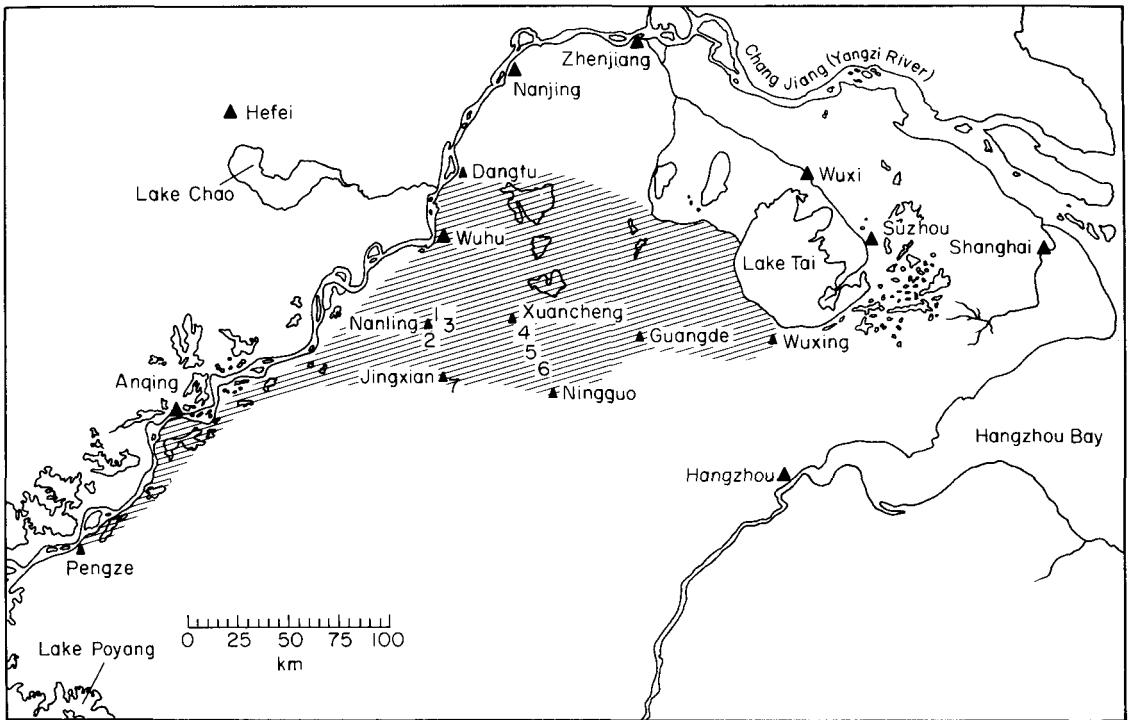
Left:
Historic range of Chinese alligator (shaded). Inset is area shown opposite.

Right:
Current range of the Chinese alligator (shaded).
Communes visited in the study area are: 1, Donghe; 2, Shipu; 3, Hanting; 4, Xiadu Alligator Farm; 5, Yishan; 6, Yanglin; 7, Baiyuan.

swamps would be considered to be prime habitat (see also Fauvel, 1879; Pope, 1935; Huang, 1982). All current indications are, however, that the alligator has been removed from prime habitat both by natural disasters, such as the flood in 1957, when most alligators of riverine populations drowned while hibernating in their dens, and by human intrusion into their habitat. Swamps have been drained to provide much needed agricultural lands. *Landsat* imagery shows intensive agriculture in all sea-level areas in this portion of the alligator's range. Thus, the prime habitat, which currently would include the Chang Jiang itself and all of its southern tributaries in Anhui Province, large lakes, and former swampland adjacent to the river is, for all intents and purposes, devoid of any significant numbers of alligators. Large lakes, such as the Nanyi Hu

north of Xuancheng, are heavily silted and underwater land has been reclaimed for agriculture. They are flooded for only part of the year and are therefore unsatisfactory habitat. Heavy use of pesticides in former swamp areas has polluted ponds, streams and rivers, and could well have affected alligators whose diets are composed of small aquatic fauna, such as fish, snails and crustaceans (Chen and Li, 1979; Huang, 1982). The surviving animals have been pushed into habitat that is less than prime. The very populous, heavily cultivated regions south of the Chang Jiang are said to be home for the largest numbers of alligators but the many very small ponds are mostly adjacent to human habitations or heavily cultivated fields. The prognosis for the alligator in such heavily human-influenced regions is extremely poor. In fact,

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animals have migrated further inland from the river to reservoirs in more sparsely populated tree farm communes. The reservoirs are affected by drought and flooding. During drought alligators leave to search for other bodies of water. The problem is that there is no longer anywhere for the alligators to go. If the alligators return to the heavily cultivated areas, they will fare no better than their barely tolerated brethren. There are no bodies of water of any significance at higher elevations, and even if there were, the lower temperatures in these regions would probably preclude successful reproduction.

Based on the preliminary survey and study of Landsat imagery, on which some reservoirs are visible, I would venture an estimate of between 300 and 500 animals remaining in the region bordering and including Xuancheng County. This figure would include the animals at the Xiadu Farm, all but nine of which were removed from the wild after 30 May 1981.

Preservation measures

The Chinese Government has set aside certain areas as alligator preserves but these are no more
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than agricultural communes on which the alligators live. The only protective measure noted was a sign on one commune stating that the alligator was a protected species and should not be killed. Although prison terms are mandated by law for offenders who kill more than three animals, there is no evidence that the law is enforced. In each area local residents reported that one or more alligators had recently been killed. Even in the foothills dens were dug into and the animals removed. On one commune, where an alligator was being dug out of her den, a local wildlife technician berated the people, assisted them in digging the animal out and then insisted that it be sold to the alligator farm, as should all animals captured in this fashion in future. Had he refused to assist the people in their attempt to destroy the den, the people would have continued work by themselves and then killed the hapless beast.

Alligator farms

The Central Government, through the local Forestry Bureau, has established an alligator farm outside Xuancheng at the Xiadu Tree Farm Commune in Anhui Province. Two additional,

less elaborate farms have been established in Zhejiang Province. The Xiadu Farm which encompasses 89 ha, with plans to increase it to 3335 ha, has no natural alligator habitat. Of the physical plant present in 1981, the man-made pools and enclosures were far from ideal and were over-crowded; facilities for egg incubation were meagre and there were no facilities for maintenance of young animals. By the summer of 1982, Huang reported 130–140 animals at the farm. Breeding occurred and over 80 per cent of the eggs successfully hatched but numbers of young produced have not been reported.

Local residents are encouraged to bring captured alligators to the farm rather than sell them to entrepreneurs or kill them. No-one would tell me how much was paid for an animal, although it was in excess of one *yuan* (about US \$-60) per jin (approx. 0.5 kg). People carried alligators to the farm in baskets suspended from their shoulders but larger animals (greater than 40 pounds) are more difficult to carry, and if the commune or alligator farm could not arrange to have a car or truck pick the animal up, the captured animal would probably have been left to die. Although the alligator farm, as part of the Forestry Bureau, had access to several motor vehicles, it was not clear to me whether the farm must pay for their use. Local communes frequently had other uses for the few motor vehicles they owned, and carting an alligator to the farm would not have been a high priority.

Alligator eggs were also brought in, sometimes carried, well covered by vegetation, in shoulder-slung baskets, but often carried unprotected in clothing pockets. People were given one *yuan* per egg. Infertile eggs and eggs which had been inadvertently turned and were no longer viable due to tearing of membranes and destruction of the embryo (Ferguson, 1980; T. Joanen, pers. comm.) were purchased and incubated along with good eggs. It was suggested that, in order to convince people that it was important not to rotate the egg, eggs that had been rotated should not be purchased. This, however, was not put into practice. Of more than 200 eggs incubated in 1981, approximately 40 hatched and 24 young survived until hibernation in October. Eighteen of these young survived the winter, but all died before summer 1982 (Huang, pers. comm.).

Although the farm certainly had enough land area, staff and money to run a successful breeding programme, the main problem was the lack of knowledge regarding facilities, equipment, organisation and accomplishments of similar farming operations in other countries, and in lack of familiarity with the current scientific literature germane to successful alligator farming. In early 1983 the farm was designated as the Chinese Alligator Breeding Centre with financial support from the Ministry of Forestry.

Recommendations

Short of establishment of well-policed refuges with enforcement of wildlife preservation laws, something which I cannot foresee as possible in a country as dependent on a small region of arable land for feeding its burgeoning population as China is, the only hope for the Chinese alligator within China is successful establishment of breeding farms with strong economic incentives to render them successful.

The Xiadu Farm can accomplish the goal of maintaining the species but it is in desperate need of information about techniques, technology and basic animal care. I suggest that all organisations working to breed crocodylians send information to the farm. It is also important to encourage the farm to establish two-way communication with other farming operations, perhaps by inviting the workers and administrators to feel free to ask questions or consult with other operations regarding their problems. We must, through official channels such as the IUCN Crocodile Specialist Group, try to start and maintain a dialogue between the farm and scientists in other parts of the world.

Although some may believe that the best way to assist the Chinese farm is by infusion of large amounts of foreign capital, I believe the most effective way would be to supply the farm with information and inexpensive technology. For example, styrofoam boxes for egg incubation, which are cheap and readily available in the West, are not available in Xuancheng. Grease pencils, waterproof marking pens, plastic sheeting and bags, disposable syringes, adhesive tape, and similar small, inexpensive items are not readily available in China, and would greatly assist the

workers at the farm in carrying out their tasks. Thus, for a total investment of, at most, two or three thousand dollars, we could give each farm necessary assistance without encumbering them with technology that they can neither use nor maintain.

A further suggestion is to attempt to persuade the Chinese to invite to China one or two members of the IUCN/SSC Crocodile Specialist Group, preferably with experience of contending with similar financial and technological exigencies as exist in China, who, themselves, have run successful crocodilian breeding operations. A future step would be to invite the farm personnel to visit one or several successful crocodilian breeding facilities. International funding would be necessary for a visit of this kind. The Rockefeller Wildlife Refuge in Louisiana is planning to invite individuals responsible for the operations of the Chinese farms to visit the US under the auspices of the joint protocol between the US Fish and Wildlife Service and the Chinese Ministry of Forestry.

Continuation of the joint US–China study, which began in 1981, would provide the Chinese with additional assistance, equipment and training at a minimal cost to the Chinese government.

The Chinese are well aware that educational programmes would be useful to convince commune inhabitants that the alligator is worth saving. Education campaigns, however, are costly, and are likely to be slow in producing results. A more direct method, suggested by the Chinese and put into practice in 1981 by a team producing a film on the alligator's life cycle, would be to make incentive payments to local people for information on location of nests, and for nest protection. At the Xiadu farm, we discussed extending this concept to include payments for making sure an alligator was neither removed from its habitat nor killed. Although I left China before I could ascertain whether the film company's scheme was successful, it would seem likely that in an economy such as China's, in which the possibility of additional income for the individual or the commune is very slim, incentive payments would produce the desired results. These payments would be very small by Western standards, and assistance to the Chinese could take the form of funding researchers to gather

information in conjunction with a farming operation. Amounts of money would be pre-determined and administered by the farms.

Without any of these measures, it is unlikely that the alligator population in China will remain viable. I would expect the animal to be extinct in the wild within the next five to ten years and serious droughts or flooding could accelerate this process.

Acknowledgments

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