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about bore-holes. First, there is no objection to shallow bore-holes (i.e. to 8 or 10 metres) in the big river valleys, for these wells tap aquifers that are recharged as soon as the rains cause the river to flow again. Many Sahel bore-holes are deep—up to several hundred metres—and they tap mostly fossil water, i.e. water stored there in an earlier climatic or geological period. The volume is finite and will not be replaced, certainly not in our era. At first there is ample water, and the tribes bring their flocks and herds from far and wide, which promptly eat every scrap of vegetation. Then the water runs out and the end result is disaster for man and beast, but by that time those who sank the bore-holes are far away. The laudable intention is to help the herdsmen through an emergency, but in fact such action usually leads, often even in a short time, to degradation that is reversible only at prohibitive cost.

Second is the problem of vested interests. Deep drilling equipment represents a big investment in capital and skill, so that vested interests are very active—at a completed cost of towards £200 per metre for Northern Nigeria! With massive American involvement, there is a craze for these deep bore-holes in the Philippines, and the water table around Manila has been dropping by about 5 metres per annum. Some US charities seem to go in largely for bore-holes. There should be a very firm rule—that however strongly a welfare officer or engineer urges the drilling of a deep bore-hole, this may go ahead only if approved by an ecologist or land use expert who can accurately assess the likely environmental impact.

In my time in Ghana there was much talk of the encroaching Sahara, and the fashionable thing was to blame a long-term worsening climate. It so happened that most of my service was in charge of districts through which the high forest/grass woodland margin passed diagonally across the country, and this was a special interest of mine. There was some agreement that there was a short-term climatic cycle (perhaps of the order of 50 years) and the boundary moved back and forth perhaps 10 to 20 miles. It seemed that I was there in the damper phase of this cycle, and we had clear evidence that the forest had recolonized perhaps 12 miles of Guinea grass woodland

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within recent years. The Sahara has indeed extended its boundaries many miles, but largely with human help and with the climate doing little to encourage it.

The truth is that the Sahel and other comparable zones are totally unsuited for permanent occupation. This is not defeatism but realism, and until this diagnosis is admitted, infinite waste of human and financial resources will occur.

If governments would persuade us that large dams may provide the water for irrigation, we should study the appalling environmental impact of such projects as the Aswan High Dam—including a huge increase in bilharzia, the salination of large areas, and the extinction of the estuary sardine fishery, which had been dependent on the silt load now settling in the dam; this same silt, from the times of the Pharaohs, had also made the Nile valley the granary of the eastern Mediterranean. Now the farmers are dependent on artificial fertilizers, which they cannot afford and which bring new problems. My present work is with simple village water supplies, and we are now seeing a big swing towards one-family, one-farm plots and one hand pump as a viable unit. But big dams are still very big business—for those who make them.

George S. Cansdale, Director, SWS Filtration Ltd, Great Chesterford, Saffron Walden, Essex, UK.

***Homo sapiens*: predator extraordinary**

On and on we go, and must go, to preserve diverse endangered species of animals and plants, world over. But so rarely do we battle with the fundamental cause of the problem, and only sometimes with proximate causes. Rarely even does *Oryx* refer to the real problem.*

Consider a normal food chain, with maximum biomass and number of individuals at the bottom, rising by diminishing stages to the topmost predator with least biomass and least number of individuals. So often, too, it is those top predators that are the special subject of our efforts in preservation, tiger, oryx and the rest. But look at *H. sapiens*, ourselves, masters of the earth, top predator of innumerable food chains, animal and plant, terrestrial and oceanic. Our numbers are

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not small: instead our numbers and our biomass surpass all other species of vertebrates. At now near 5000 million people, our biomass probably exceeds even the krill of the Southern Ocean.

We succeed, so far, in the maintenance of this vast biomass and vast population by a variety of expedients. We are highly omnivorous, and so feed from many food chains. We deliberately breed other species of animals and plants for our convenience. We mine from our environment both the living (reduction of other species) and the lifeless (fossil fuels and minerals). Contemporaneously and progressively, we eliminate the killing diseases that afflict our own species. Our total population and biomass continue to magnify: they have virtually doubled in the last 40 years.

We have, with the new powers of communication, television and the rest, become almost instantly aware of what is happening to others of our species world over. We develop an unprecedented and admirable caring for individuals and populations of our species at a distance, and

some among us strive for the preservation of other species and the environment as a whole. Yet, though we have the awareness, we are far from having the essential width of understanding and wisdom to alleviate. How few are those, even readers of *Oryx*, who ever pause to ponder the appropriate means of control of the population of our own species, which overpowers all our puny efforts for the preservation of other species. Acid rain, over-fishing, depletion of forests, greenhouse effect, loss of species year by year, all are caused by our own excessive numbers. Our actuaries calculate that, of all humans who have ever lived since our species evolved, 10 per cent are alive simultaneously today, so fast has been our multiplication, very largely in the last century. And still we burgeon. That is reality: the biological position is utterly unsustainable.

Colin Bertram, Ricardo's, Graffham, Petworth, West Sussex GU 28 0PU, UK.

*But see 'Man Pressure' *Oryx* Vol VII, August 1963, and 'Man Pressure Again' *Oryx* Vol XIV, December 1977, by the same author. Dr Bertram was formally a Council member of FFPS, and was Chairman of the Sirenia Specialist Group of the IUCN Survival Service Commission.

Map showing regions used for Briefly . . .

This map is based on that used by the Wildlife Trade Monitoring Unit at the IUCN Conservation Monitoring Centre in Cambridge, UK.

