

VI. MEETING THE CHALLENGE

Trends in water consumption indicate that demand for water for household and industrial uses in developing countries could double as a proportion of total water demand in the next 25 years. Scope for water supply expansion will at the same time be limited because development of irrigation and urban water supplies is becoming increasingly expensive, and often involves high costs in terms of environmental degradation and human resettlement. The countries experiencing water stress now as well as estimates of water withdrawal for different purposes are shown in figures 4 and 5. Water quality problems such as arsenic contamination of ground water are increasing in Taiwan, Chile, Mexico, China, Bangladesh and the West Bengal part of India. Without fundamental reform of water management, the rapid growth in urban water demand will require large transfers of water from irrigated agriculture, thereby threatening food security. Hence, water supply and demand should be managed in an integrated fashion, considering simultaneously all uses and sources. Particular attention will have to be paid to avoiding water pollution.

How can we accomplish this objective? At the global level several initiatives like organisation of a Global Water Partnership and a World Water Council have been taken in recent years. At a meeting held at Valencia in Spain in December 97, the participants recommended the establishment of an *International Water Centre* for undertaking research, analysis, appraisal, information dissemination, training and consultancy activities. Such a Centre could also specialise in water laws and help in resolving water disputes through analysis and information. It was felt that we urgently need a new instrument for promoting sustainable water security in the world.

Charity begins at home — while global mechanisms and institutions are important, it is essential that every country sets up institutional structures to deal with national and local level problems. *International Conflicts over water are often precipitated by a failure to meet local, provincial, national and regional water demands for household, agriculture and industrial uses as well as for environmental / ecosystem services.* The various sources of water and sectoral needs are indicated in Fig. 2.

An institutional structure for dealing with the multiple dimensions of water management at the country level is proposed in Fig 3. I have suggested the title "*National Water Trust*" instead of the commonly used term *National Water Authority*, to emphasise that water management should be carried out in the trusteeship mode. *We must consider ourselves as trustees of water sources and not as owners.* This will help to instill the feeling that management of water should not only be in the interests of the present generation but also of the generations yet to be born. Thus, the guiding principle for the work of the National Water Trust will be intra- and inter-generated equity.

Provincial and local level units of the National Water Trust can be organised, according to needs. The National Water Trust will serve as the hub of a grid of institutions including policy making bodies. It will thus serve as the flagship of a national system for sustainable water security.

VII. WATER SECURITY : BRIDGE TO A MILLENNIUM OF HOPE

1998 marks the bicentenary of Thomas Malthus's essay on population. In 1798, Malthus warned "the period when the number of men surpass the means of subsistence has long since arrived". When Malthus wrote his essay, the global population was less than the current population of India alone, namely 970 million. There is adequate food in the world today at *current levels of purchasing power*. Hunger is presently more related to economic access than physical access. Irrigation water availability and management have played a pivotal role in keeping Malthusian predictions at bay. Our ability to maintain a *satisfactory balance between population and food production* will depend both upon population policies and food production strategies. Every nation will have to develop an appropriate mix of water supply augmentation and demand management through socially and ecologically constructed policies and technologies. Comprehensive policy reform that promotes efficient use of existing water supplies will be needed in most countries. The National Water Trust proposed in this paper would be of help in integrated planning and decision making.

Above all, cooperation between countries sharing the same river or water source will become increasingly important. This is also true for States within a country having a federal constitution. Differing perceptions on the value of artificial rainmaking is a case in point. National and international mechanisms for proactive action on potential water conflicts will have to be put in place. International cooperation is also essential for avoiding adverse changes in climate, particularly precipitation and sea levels, arising from the accumulation of greenhouse gases in the atmosphere. A major step in this direction has been taken at the Conference of Parties to the Framework Convention on Climate Change held at Kyoto in December, 97. Meanwhile, it will be prudent for all countries to be prepared for different weather probabilities based on *computer simulation models*. Both avoidance and mitigation strategies should be developed. It will be appropriate in this context to recall the words of Mahatma Gandhi.

"Nature provides for everybody's need but not for everybody's greed".

NOTES

[1] Agarwal Anil and Sunita Narain (eds)(1997). "Dying Wisdom : Rise, fall and potential of India's traditional water harvesting systems." Centre for Science and Environment, New Delhi pp.404



SKIFFS

JOSE BEJARANO

Along the beach skirting Ceuta's tuna-fishing grounds, the only sound to be heard at that time of day was that of the waves gently lapping the sand laden with the smell of diesel oil left by

the fishing boats tied up there. The calm sea and a light breeze out of the west augured a safe crossing. Several skiffs were leaned up against the sheds used as a repair shop. Were the "Black man" and his men going to be there? Our impatience had gotten us there a quarter hour ahead of the appointed time: one o'clock in the morning.

The "Black man" showed up with his three mates and, after greeting us without making much of a show, they went into one of the sheds to haul out a bright, shiny 70 h.p. Yamaha engine. They didn't turn on any light, but we were able to see our way around thanks to the yellowish light shed by a streetlight in the far distance. They mounted the engine on a skiff which looked as if it had just come out of the water. One of the men painted out the registration number of the craft using a can of blue paint and a brush he had also gotten out of the shed. Then, they hauled on board the two big tanks of gas they needed for the trip.

Each man knew what he was supposed to do and went about it like clockwork without anyone having to give any orders. They didn't even say a word the entire time they took to get things ready. We were the only ones entertaining any doubts. Where were the other passengers? When were they getting on board? Later, somewhere else in Ceuta, the "Black man" explained. The question we didn't ask was if they had changed the boarding spot because they were afraid that we might have set them up and were worried about falling into a police trap. We had provided them with proof of our being above board, but every possible precaution is probably never enough for these organizations.

Later, we found out that the illegal emigrants would be coming aboard on the beach in the district of Benzú to the west of Ceuta. Far outside of town, dozens of skiffs requisitioned by the Spanish Civil Guard were piled up around this cluster of houses. On the beach were the "Black man" and his right-hand man. They had had enough time to drive up to the Principe district, to load up the illegal emigrants hidden away in shanties and to make it back down to Benzú. From inside a van parked in the dark, at a spot on the road where the streetlights had been shattered by intentionally-thrown rocks, a string of men began to emerge. The boat rocked up and down roughly and creaked under the weight of each additional passenger. We counted eighteen men and two women, who, added to the two of us and the two crewmen, totaled twenty-four passengers in all.

The major problems involved, in addition to the Spanish Civil Guard being there in their launches, might be the sea conditions and that our moving around and rocking the boat might make us capsize. Ahmed explained this to the passengers in Arabic. He translated everything he had said to them into one single short phrase: stay put. Mohammed and Ahmed knew the Strait like the palms of their hands and were familiar with the currents and the winds and even with the courses navigated by the big ships that sailed these treacherous waters.

The night was just right for making this trip with smooth sailing all the way. It was dark enough for us not to be seen, yet clear, which made it possible for us to make out the lights on the coast of Spain and on the ships sailing by from a distance. The sea was calm, and the wind was blowing from the west. Some unbeatable conditions for the trip, he concluded. But this same thing was also in the minds of men in charge of guarding the

coast of Cadiz, who, on nights like this, in fine spring weather, would be expecting at least a half dozen boats, some loaded with drugs and other with illegal emigrants, to be coming ashore.

Ahmed sat down by Mohammed, who was already racing the engine to shove off into the darkness of the night. The strong headwind caught us off guard, sending a shudder through us, and we sailed on hunched in silence. Only the roar of the engine cut through the silence of the night. Without this noise, we would have heard our heartbeats racing out of excitement. It was so dark that we could not even see the wake we were leaving behind. The plastic bags with the dry clothes that we were supposed to put on when we reached shore started to jostle around from one side to another in the bottom of the boat and to get tangled among our feet. The sickly-sweet smell of the gasoline in the plastic containers turned bittersweet on mingling with the salt air.

The string of yellow lights in Ceuta cast a golden reflection on the sea. No one uttered a word. Almost all of us sat there with our hands in our pockets, hugging onto our jackets, clenching our teeth, our heads hanging down. It looked as if we were looking for something to hold onto in the dark bottom of the boat. All of a sudden, the bow began to bounce high in the air against the waves. All heads turned toward Ahmed in search of some explanation for our peace of mind. We were no longer sheltered from the wind and waves, but were now out at sea, so that wave-hopping which was sometimes leaving us with a hollow feeling in the pit of our stomachs was going to be going on until we neared the Spanish coast. My jaws were starting to ache from being clamped shut.

Ahmed ordered us to raise up our heads if we didn't want to spend the rest of the crossing hanging overboard throwing up. The golden light of Ceuta was now gradually fading into small specks of light reflecting off the whitecaps.

Having been distracted by the lights dancing on the water, we failed to notice the hulk of a merchant marine vessel which was sailing by us on its way into the Mediterranean. Ahmed had realized it was there before we did, and by the time the rest of us saw it, the bow of our flimsy craft was already being stood on end by the crests of the waves that it was churning up along its path.

In the darkness of the night, we could be run under by any one of the hundreds of ships that sail through the Strait without its captain's wine glass even being jarred on the dinner table. The radar systems on these ships are set to a scale which doesn't pick up such small craft or, in the best of cases, doesn't distinguish us from the trail left by a dolphin or from a seagull. The merchant ship's wake raised our skiff's bow, pointing it skyward to then drop back down into the blackness of the sea. Up to that point, we had not actually realized just how fragile our hull really was. Some of us spread out on the bottom of the skiff to hold on to the boards we had been using as seats.

The spotlight suddenly hit the skiff like a blow out of nowhere, scanning over our heads just like machine gun fire. The patrol boat was bearing down on us a high speed. The spotlight scanned the darkness without honing in on us for more than a few seconds due to the zigzagging of our craft. Under these conditions, we had few prospects of getting away. Then we heard the warning shots fired by the Spanish Civil Guardsmen, popping in the night, muffled by the wind, and Ahmed

instinctively shut off the engine. Once again, the spotlight shone directly on the skiff, this time long enough for us to see each other's faces and to surprise one another with our hands up in the air. We discovered that there were two young girls on board. Thwarted in our attempt. The officers' voices could be heard telling the skipper to bring the patrol boat alongside the skiff for them to board our craft. Something must have run amuck in Ahmed's mind when he heard the Civil Guardsmen's orders, because he suddenly grabbed onto the engine control and stepped on the gas so fast that he threw us all down in our tracks. Back in the shelter of darkness, the skiff made a desperate break for the coast. It was all for nothing.

The repeated shots, probably fired into the air as a warning, now sounded louder as they echoed off the rocks. The strain of making a getaway, the dire need of making it to the nearby coast, deafened our ears to the shots. The blackness of the cliffs, outlined against the yellowish blue of the sky, was moving toward us while the bursts of cannon fire darted all around us, desperately exploring the water. Without being able to see us, the patrol boat crew was chasing in hot pursuit. We could hear the shots being fired in the air and the two high-powered engines of their boat. We were getting a close-up view of its one crazed, socketless eye. Several times, that enraged beast was about to run us over while one of its crew fired shots and shouted.

Stop, you bastard! You're going to kill 'em all!

Other times, they managed to pull up alongside the skiff, but when one of the officers, gun in hand, was all set to jump on board, Ahmed would veer, and we would go zigzagging off into the night. Our skipper played cat and mouse long enough to near the coast. Savvy Ahmed knew that as of a certain point the patrol boat would have to give up the chase for fear of running aground. The spotlight on their tower stayed fixed on us until we made it to the rocks. We all jumped frantically off the skiff and onto the steep slope, each one grabbing the first bag of clothes to be found at his feet. Drenched, we were stumbling into one another, banging our shins on the rocks, some bags splitting open like rag dolls leaving a trail of stuffing behind in the night. But we had made it to dry land.



FLUIDS AND FLOWS

MANUEL G. VELARDE

Fluids, swirling, whirling.... the stuff that dreams, poetry, life, evolution, beauty and its waning — even horror — are made of. Fluids and swirling, whirling, infinitely flexible, slow, fast, short, microscopic, long or incommensurable.

Water, air, clouds — cumulus, stratus, nimbus, cirrus clouds... Whirling, swirling, microworld (superfluids), macroflows (tornadoes, hurricanes, galaxies in the infinite) almost infinitely expandable.

Fluids, the driving and master of nature, capable of allowing some solids to float and of pulling others under.

Rasping fluids for spermatozoids, protozoa and pollen; inertial, uplifting fluids for man, sharks and dolphins.

Whirling, swirling, spirals, jets, drops.... infinite bonds, symbols of life. Waves, ripples, bores, tsunami, ... symbols of life as well as of horror.

Water everywhere. We are almost made only of water. An elephant is almost three-fourths water: an earthworm, eighty percent; a jellyfish, ninety; a young human body, forty; an old one, three-fourths although wizened.... and our brains, eighty percent. This planet is over seventy percent water, and the atmosphere and that trailing behind is fluid almost ad infinitum. A cactus hardly half a meter tall can grow down several meters below the desert surface to trap imperceptible moisture and thus live almost eternally.

Water, whose boiling point changes from valleys to mountain tops. Capable of boiling, freezing and evaporating all at the same time, or of expanding and weighing less when frozen. From freezing to evaporating, from boiling to cooling. An extremely poor heat conductor, and yet a perfect heat-transporting fluid.

Water, air.... we are machines whose fluid functions, of air, of blood and of other waters are many: jets, membranes, filters, force and discharge pumps or dual-purpose ones, faucets ...

Fluids which are shapeless, yet which are capable of taking on infinite forms. Liquids, water, neither an infinitely imperfect gas nor a perfect solid crystal. Liquids, imperfect fluids, hybrids and yet endlessly evolving, creating. Without any error, without any defect, evolution would not have taken place, new species as the advantage of having put an error to good use. Mankind's survival would have been impossible without the migratory flow, without the interbreeding currents.... without the unorthodox displeasure having been taken in the apparently unquestionable as perfect.

Fluids, the symbol of adventure, of the unforeseeable, of turbulence, of chaos.... and yet the underlying flow of creation. Without fluids, a void.

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THE MEDITERRANEAN BASIN: WATER TO COMPRISE THE CORE OF ALL FUTURE CONFLICTS

BY SAMI NAÏR

In the mid-seventies, warning of the dangers which were lying in wait for the Mediterranean would have generally been taken as being alarmist and absurd. Today, this comprises a commitment and a duty. Environmental disaster is not only a serious threat which is looming over this region, but a progressively more well-founded probability. The degradation of the seas is quickening in pace, and pollution along coastlines has become more obvious since then. One out of every six oil tankers in the world sails the