able to receive certain SIRA publications and make some contribution to the running of the association.

Some of the increase in exports which Mr Storey is looking for may well come through sales to eastern Europe, in view of the agreements for technological cooperation which the Ministry of Technology has negotiated. To encourage the sale of instruments to the Soviet Union, an Anglo-Soviet working group dealing with standards and metrology has been set up, with the British Standards Institution, the Ministry of Technology, and the Scientific Instrument Manufacturers Association (the instrument industry's trade association) responsible for the British side of the negotiations. The second meeting of the working group was held in Moscow recently, when the two sides devised ways of removing technical obstacles to the flow of trade, chiefly to do with the testing, guaranteeing and servicing of exported instruments. SIRA itself is not being slow to exploit the opportunities which seem to be arising, and is now hoping to set up some kind of relationship with the instrument industries in Hungary and Poland.

HYDROLOGY

Another Barrage

YET another barrage—across the Wash—has reached the drawing board. It was announced last week that the Water Resources Board has been authorized to go ahead with a desk study, and a consulting firm of civil engineers, Messrs Binnie and partners, has been appointed to do this as a preliminary to a full feasibility study. The desk study should be completed by the end of next year.

The idea of a barrage across the Wash is not new. It received its biggest impetus perhaps, in 1966, when it was one of the recommendations in the Water Resources Board's report on *Water Supplies in South East England*. In this report the board described some schemes which could meet the increasing demand for water in the south-east—a demand which will probably have doubled by the end of the century. A barrage across the Wash turning the area into a huge storage reservoir was a project which the board suggested ought to be investigated before the early 1970s, when its strategy for the period after 1975 has to be decided. The board's plea for the investigation "to be put in hand immediately" could not be said to have been fulfilled, and planners must hope that not too much time has been lost for the barrage to be included in future planning of water resources.

Another major project under way is the study of the use of the underground water storage in the chalk of the Thames Valley to "top up" the flow of the River Thames in dry spells and so provide throughout its course the additional water supplies needed. A full-scale experiment on this has now completed the second of its three seasons of study and the final phase will be started next year. A second similar experiment was started this year in the Great Ouse catchment near Thetford.

Two other barrages for the storage of water that have received serious consideration by the board are the ones across Morecambe Bay, for which there is a full feasibility study in progress (see *Nature*, **217**, 599; 1968), and the Solway barrage for which as yet there has only been a desk study. More topical, perhaps, is the scheme for a barrage or barrier across the Thames (see *Nature*, **220**, 111; 1968) which unlike the other two would have as its primary function the prevention of floods. For all the schemes, however, there are the same basic problems to be considered—things like cost effectiveness, tidal movements, siltation, ground water, ecology, and environment. The Greater London Council has started investigations into the silting of the Thames, and the effect the proposed barrage would have on ground water levels in the Thames Valley. There could be trouble if the level of the Thames were kept at a constantly higher level than the present low water mark. The GLC proposes, therefore, to drill about 100 boreholes at various points across the valley to investigate ground water levels and movement. Recorders will be installed in the bores to collect data for about two years and these will be analysed by computer. The Institute of Geological Sciences and the Building Research Station have wide experience of silting and ground water and they are cooperating in the project in advisory capacities.

RIVER MANAGEMENT

Clearance by Carp

BRITAIN spends about £2·5 million a year on removing water weeds from inland waterways, and in 1964 the British River Authorities spent on average £69 per mile on weed clearance. In an attempt to cut these costs the Ministry of Agriculture, since 1964, has been experimenting with the grass carp, a fish native to China but widely cultivated for food in South-East Asia and Central Europe, as a means of biological control of water weed. Although the experiments are still at a very early stage, no major snags have occurred so far and the ministry's Salmon and Fresh Water Fisheries Laboratory is still optimistic that the method may work.

In 1964 several 7·5 inch fish kept in wire netting pens successfully cleared a Kent pond overgrown with Canadian pond weed. This spring 2,000 one and two year old fish were imported from Hungary and have been used in experiments in fenland ponds. Thirty-seven pounds of small fish introduced into one pond have increased in weight to 381 pounds in twenty weeks and consumed about 7·5 tons of weed in the process. The fenland drainage channels might well be kept clear in this way, using electric barriers to confine the carp as they graze successive strips of the channels. The ministry is, however, understandably unwilling to allow widespread introduction of the species until more is known about its biology in Britain for fear that it may breed, get out of control and completely upset the balance between plants and native fish. The chances are that the grass carp, which has only bred naturally in Japan and Formosa apart from in its native waters in China, will not become established as a breeding population in Britain, but it is not worth risking at this stage in the work. And even if it does not breed, the numbers introduced into waterways will have to be carefully regulated because water weeds are at the base of the food chain on which native British coarse fish, which are omnivores or carnivores, depend. Granted this, if the experiments continue to progress as well as they have done since 1964, the grass carp could well become

the first example of the exploitation of fish for biological control.

FOOD PRODUCTION

Starvation round Another Corner

For once, the annual report of the Food and Agriculture Organization has some cheerful news to relate. According to preliminary estimates, food production rose by about 3 per cent in the world as a whole in 1967 and by 6 per cent in the developing countries. The losses incurred in the disastrous harvests of 1965 and 1966 have been made good, and *per capita* rates of food production in the developing regions are at least no lower than they were in the early sixties.

Good weather apparently takes most of the credit, though the introduction of high yielding varieties of cereals has proved very successful. The most effective of these proved to be a strain of dwarf rice developed in the Philippines and some dwarf wheats developed by the Rockefeller Foundation in Mexico. But the report is anxious to scotch any premature optimism. In many countries cereals are not a basic food, and in others natural conditions are unsuitable for the high yielding varieties. Further, successful use of the new varieties is contingent on improvements in fertilizer supply and irrigation control.

The most serious nutritional problem facing the world continues to be the shortage of protein. The new cereals will contribute here by releasing land from cereals to the production of protein-rich crops, and lowering cereal prices sufficiently for them to be fed to livestock. There is also promise of a strain of wheat which combines high yields and high protein content.

The report emphasizes the obvious economic truth that any lasting solution of nutritional problems in the developing world depends on home consumer purchasing power and thus on progress in non-agricultural sectors of the economy, though the report has no remedies to offer except gently to beseech the rich nations to abandon their evil ways and pursue less selfish forms of foreign trade.

ENGINEERING

Teaching Tribology

For a subject which officially came into existence only two years ago, tribology probably holds a record for the number of committees, panels and centres set up and educational courses initiated to ensure its continued wellbeing. Most of this activity was sparked off by a report published by the Department of Education and Science (HMSO, 6*s* 6*d*, 1966) in which the word tribology was coined for the science and technology of interacting surfaces in relative motion. The report deplored industry's lack of awareness of tribology and stressed the need for education—both general and specialist.

The University of Leeds now offers a twelve month MSc course in tribology which includes the fundamental principles of lubrication, friction and wear; the analysis of lubricated machine elements and the selection and design of bearings. The Universities of Reading and Swansea are cooperating to start a similar MSc course this year. The Universities of Sheffield, Salford, Aston and Swansea offer an assortment of part time courses, evening classes and intensive two or three week postgraduate courses covering most aspects of tribology. A number of colleges of technology and technical colleges hold evening classes, concentrated courses and symposia.

A third series of short courses on lubrication is to be held at Imperial College this year. The courses, each a week long, are designed for practising engineers and designers in industries, and are practical and non-mathematical. There are general courses of about thirty lectures each which provide an introduction to the subject or a background for specialists. The syllabus has been modified and developed with the help of the 400 engineers who have so far attended the courses. One new feature is a discussion on centralized lubrication systems and their development from grease guns to completely automated units. A particularly interesting set of lectures deals with the diagnosis of bearing failures. There are also two more specialized courses—one on the lubrication of large and medium diesel engines and the other on automotive bearings. In both courses special methods of calculation for dynamically loaded bearings are discussed.

MEDICINE

Medicine and Biochemistry

What contribution has the biochemist made to medical knowledge in the past and what might medicine hope to gain from biochemical research in the future? These were the questions which Professor E. B. Chain, Nobel laureate, considered when he spoke to the British Postgraduate Medical Federation in Senate House, University of London, at the inaugural lecture of the series, "The Scientific Basis of Medicine". In tracing the development of biochemical knowledge Professor Chain drew attention to two stages or eras in research. The first, with its relatively crude and inexpensive techniques of analysis and separation, saw the isolation of vitamins A, B_1 and B_2, of hormones such as insulin; and initiated the elucidation of the metabolic pathways, such as glycolysis, oxidation and the urea cycle. The contributions to medicine were enormous; Garrod's work on inborn errors of metabolism, Hopkins' research on vitamin deficiency diseases and the discovery of hormones were the highlights of the era. The understanding which they gave into the cause of disease produced more widespread effects than many of the more recent biochemical discoveries.

The present era of biochemistry with its emphasis on sophisticated techniques and expensive equipment began with the demonstration in 1937 by Tiselius of protein cataphoresis. This led the way for analytical and diagnostic advances—for example, immuno-electrophoresis, which pinpoints diseases of the lymph and nutrition disorders, and demonstrates serum enzyme abnormalities produced by tissue lesion. The uses of radioactive isotopes and spectrometers and ultracentrifuges are a few of the new techniques; combination of two techniques—say, detection and separation methods such as gas chromatography and scintillation counting—provided further automation. Autoanalysers are now widely used both in research and in diagnosis.

These machines and the techniques which they