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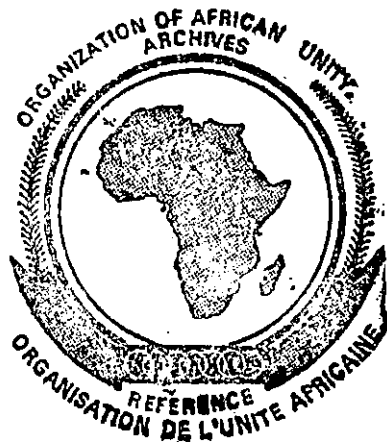
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Addis Ababa اديس ابابا

COUNCIL OF MINISTERS
Twenty-First Ordinary Session
Addis Ababa, May 1973

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REPORT OF THE
INTER-AFRICAN PANEL OF SCIENTISTS ON SCIENCE AND TECHNOLOGY



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A G E N D A

1. Address by the Executive Secretary - Mr. A.O. ODELOLA
 - Election of Officers
 - Adoption of Agenda
 - Organization of Work
2. Promotion of effective application of existing scientific knowledge and technology to development.
3. (a) Acceleration of the Programme for the Transfer and Adaptation of Science and Technology to Development;
- (b) The Creation of a favourable climate in OAU States for Innovation to the Technique of Production.
4. Mobilization of efforts of scientific and research Organizations or Institutions of higher learning in OAU States for the solution of problems which are of regional interest of Africa.
5. Suggestion of suitable research and development priorities to OAU States.
6. Encouraging Joint and Co-operative Projects in the fields of Science and Technology in OAU States.
7. Recommendations.
8. Any other matters.
9. Closure.

LIST OF WORKING DOCUMENTS

DOCUMENT NO.

T I T L E

Report and Recommendations of the 1st Meeting of Scientific Council of Africa - LAGOS, 3-14 December, 1965.

Report of Second Meeting of the Scientific Council of Africa, - ADDIS ABABA 8-12 April, 1967.

L(70)15 Report of the Scientific Council of Africa (Third Meeting) - CAIRO, 20-23 April, 1970.

L(72)2 Report of the Scientific Council of Africa (Fourth Meeting) - IBADAN, 1-4 November, 1971.

L(72)7 Report of the Inter-African Committee on African Medicinal Plants - LAGOS, 16-19 May, 1972.

L(72)8 Inter-African Committee for Maps and Surveys LAGOS, 17-22 July, 1972.

L(72)9 Inter-African Committee for Building Materials, Design and Construction - LAGOS, 22-27 July, 1972.

L(71)12 13th Meeting of International Scientific Council for Trypanosomiasis Research (ISCIR) LAGOS, 7-11 September, 1971.

L(71)13 Panel of Scientists on Oceanography, Sea and Inland Fisheries Resources in Africa - LAGOS, 14-16 October, 1971.

African Convention on the Conservation of Nature and Natural Resources (signed by Heads of State in September at Algiers 1968)

REPORT AND RECOMMENDATIONS

OPENING OF THE MEETING

Addressing the opening Session of the meeting of the Panel of Scientific Committee on Science and Technology, the Executive Secretary, Mr. A.O. ODELOLA, expressed the appreciation of the Secretariat to the Committee for honouring its invitation. He indicated that 7 scientists were invited to the meeting, unfortunately, there was no news despite several reminders from Professor Nanamoudou Magassouba of Guinea and Dr. Fisseha H. Meskal of Ethiopia. He suggested that this might be due to the difficulty in the communication in Africa. He was grateful to Professor D.P. Wasawo of Kenya, Professor T.A. Moussa of Egypt, Professor J.Y. Equisie of Ghana, Professor A.O. Adekola of Nigeria and Professor Malu of Zaire for finding time to attend the meeting despite their very heavy individual commitments in their respective Universities and Research Institutions.

The Executive Secretary briefly outlined what prompted the Scientific Council of Africa (CSA) to set up the Panel on Science and Technology. The CSA is aware that during its annual 4-day meeting, it is impossible for the Council to discuss in detail all the problems that come before it in the field of science and technology. It therefore considered it appropriate that the Panel of Science and Technology be established to discuss all these problems with a view to submitting detailed appraisal of the situation from time to time to it. In this way, the CSA will have at each meeting policy suggestions in the field of science and technology which has received the prior and mature consideration of eminent scientists on the Panel on Science and Technology.

At the end of the Executive Secretary's brief remarks, the meeting agreed that Professor D.P.S. Wasawo be Chairman of the Panel and that Professor A.O. Adekola be Rapporteur.

The Agenda proposed by the Secretariat was adopted as a working basis with minor rearrangement.

GENERAL COMMENTS:

General comments were made by the members of the Panel on the invitation of the Chairman, as follows:-

1. The need for scientists to be able to communicate in English and French irrespective of whether they are from Francophone or Anglophone countries.
2. The need for an inventory of areas of science and technology to be used. An appraisal of the techniques to be used in the field and the benefits derivable from these.
3. The need to identify obstacles to application of science and technology in order to resolve these and ensure an effective utilization of techniques for development. This may be gone through discipline by discipline.
4. The need to know the recommendations of earlier panels and previous recommendations of CSA in regard to priorities. Selection of areas of common interest either on a regional basis or on a continental basis for concerted efforts.
5. Co-operation between universities and research institutes, in particular the involvement of university research workers in applied research.
6. Assistance to universities by governments and industry in training scientists in the various disciplines. Universities and research institutes should co-operate in the training of scientists.
7. The need to translate existing research results to production and development. This will call for the institutions of finance to develop what the African scientists have been able to achieve.
8. The need for a meeting point between scientists and financial houses with a view to stimulating interest in the translation to industrial products of results of researches.

9. The realization that it is only through co-operative efforts among the countries of Africa, either on a regional basis or continental basis, that, through pilot projects, some progress in utilization of research results may be made.
10. The need for African scientists to be used in tackling Africa's problems. Usually African governments prefer to use foreign experts instead of taxing local scientific manpower. This would call for a survey of personnel according to specialization throughout Africa.
11. The need for flow of information - in co-operation with regional or national centres.
12. The need for co-ordination of activities between various countries. Appraisal of existing STRC Projects with a view to expansion, if necessary, and the addition of new projects.
13. Need for political decision at the top in crucial matters.

It was agreed by the panel to discuss agriculture first as it services as a good example of problems requiring special attention of African scientists.

APPLICATION OF EXISTING SCIENTIFIC KNOWLEDGE AND TECHNOLOGY·
TRANSFER AND ADAPTATION OF SCIENCE AND TECHNOLOGY TO DEVELOP-
MENT.

- AGRICULTURE

Agriculture is viewed as an industry, the objective being production of more food. Improvement of agriculture implies the need for national and regional strategy. There is also need for science policy on agriculture. The problem was discussed under the following headings:-

1. Preparation of the Land

Problems to be dealt with are:

- (i) Soil erosion
Existing scientific knowledge should be applied to prevent erosion.

(ii) Economic size of farms:

There is need for governments to own and manage big farms where modern methods of preparation can be applied economically - e.g. the use of tractors for clearing. Traditional farmers should be assisted to form themselves into co-operatives to avail themselves of the opportunity of using tractors for preparing the land. Traditional farm implements should be subsidized or by some other means, made available to the farmer at cheaper rate. This would achieve some results in the short run.

(iii) Soil Survey: The soil Map of Africa prepared by CCTA is not of the right scale for agricultural purposes. There is need for a detailed survey of soils to determine capability. Map of soils in Africa need to be prepared.

2. Production of new varieties and their multiplication

Zaire's experience of improvement of crops through mutation using irradiation should be further investigated. Zaire using this technique produced a variety of groundnut resulting in bigger yield and better quality without application of fertilizers.

3. Water Resources and Utilization

A study of water resource is essential to promoting agriculture. Surface water in rivers, lakes etc... should be utilized to ensure a longer annual period of agricultural activities. Existing methods of transporting water through canals or pipes should be utilized wherever it is economical. Studies should be made of ground water capacity. Groundnut-water profits should be studied through the use of radio isotopes to determine water level. African capability exists for tackling this problem in the Egyptian experience. Methods of desalination must also be sought and put into active practice by nations requiring this method of solving their water problems.

4. Fertilizers

Natural methods of fertilizing the soil should be encouraged as these are more economical for the small farmers, e.g. crop rotation, use of compost, animal droppings etc... The application of artificial fertilizers should be preceded by soil study to determine suitable type according to the type of plant. Zaire's experiment in using nitrogen fixing bacteria instead of artificial fertilizers should be encouraged where possible.

5. Harvesting

The problem here may be breeding of new varieties to make mechanized harvesting easier. Insufficient attention and care had hitherto been paid to problems of harvesting. Methods of harvesting need to be developed to avoid wastages.

6. Storage

At least a third of crops produced in Africa is lost due to inadequate or non-existent storage facilities. There is a need to find the best method of storage according to crops. More work should be done in this area. There is need for exchange of information on the practices in various African countries. Traditional methods should also be studied with a view to upgrading them where necessary. There is need for more research study of pests control methods in storage.

7. Processing - Food Technology

At present, a lot of wastage takes place through destruction of perishable food or attack by pests on grains. Processing is a good method of preservation that can earn each country additional revenue.

In this regard, the panel welcomes the OAU proposal to establish institutes for the training of personnel in food processing and food technology.

LIVESTOCK

This subject was considered with the following important areas of animal husbandry in mind:-

1. Diseases
2. Breeding
3. Production of Animal Feeds
4. Milk production.

1. Diseases:

The panel noted that STRC already has some experience in this field especially in the areas of rinderpest and contagious bovine pleuro-pneumonia campaigns.

It was also noted that National Disease Control Bodies exist for example in the field of trypanosomiasis and tsetse. The control divisions are attached to the Animal Health Units in various States. Method of control used include spraying and clearing. Progress in this area has however been hindered by inadequate provision of funds by various nations.

The panel supports the recommendation of the 13th Meeting of the ISCTRC that Joint Co-operative Campaign be undertaken by all OAU States to control the vector of the disease. Efforts should be made by the Executive Secretariat to obtain aid from national and international donors such as USAID, ODA, UNDP etc... Co-operation is further emphasized on the ground that the free breeding of the pest in a country not paying due attention to its control could frustrate the efforts and investment on control by neighbouring vigilant countries.

The panel was informed that an official of OAU/STRC, a microbiologist based in IBAR Nairobi, has been designated Co-ordinator and Liaison Officer of Trypanosomiasis activities in Africa. His duties include co-ordination and harmonization of research and field control activities. If necessary, he may participate in conducting sample surveys of the requirement in various countries to assist the Secretariat in compiling a shopping list with which to seek international assistance.

The panel considered it a matter for regret that the 1964 Kissi report, covering countries like Liberia, Sierra-Leone, and Guinea, has failed to attract international aid. It therefore emphasized the need for African Governments to put in more financial effort and co-operate in this field at least on a regional or sub-regional level.

More research effort is needed in determining chemicals that are effective in ensuring control. This should be on a continuing basis in view of the tendency of pests to develop immunity to chemicals after a time in use. Reports of such research efforts should be collected and circulated.

The panel was informed of the new International Centre for Insect Physiology and Ecology recently established in Nairobi through UNESCO assistance. This Centre is engaged in research in biological control methods. It was agreed that every effort should be made to increase knowledge in this area as it may be a more effective way of control than the physical methods.

It was noted that certain bilateral and multilateral agencies tend to persuade governments to establish research centres to look into aspects of local problems that are beneficial to outside interests and in any event tend to keep important research results secret from the scientists of the host countries. Such institutes tend to cripple the growth of national institutes and should never be allowed to establish without the advice of the National Scientific Council of each State. Offers of bilateral or multilateral assistance in the field of research should be accepted only if they are to be used to strengthen existing national institutes and scientists who are nationals of host country are allowed to be fully involved in the research work or, where none are available, trained to ensure a national capability of continuing the effort. Developments of centres should be communicated to STRC.

Foot and mouth disease is important in most parts of East Africa. There is an urgent need to tackle this disease and eradicate it because of the obvious danger of spread all over Africa. It was

noted that East Africa is already setting up machinery to deal with this and the STRC should come in and participate especially in getting OIE, FAO and OAU financial support for the effort.

2. Breeding and Beef Production

Modern beef production as against traditional methods has become a necessity. Every government with the suitable environment should establish ranches to enable beef production to be done on an organized and large scale under controlled conditions.

3. Animal Feed

The problem in animal feed is the question of inadequate pasture land. It was noted that most countries depend solely on naturally growing pasture. There is now need for pasture of the right variety to be cultivated as animal feed.

4. Milk Production

Traditional methods of transporting cattle within and between countries were noted, but viewed to be inefficient, and waste the cattle, nutritive-value-wise, by the time they are ready for food. The breeding of cattle and goats was discussed to increase meat and milk production.

FISHERIES:

The position of fisheries in Africa was discussed. The panel regretted that this area has not hitherto been treated with the urgency it deserves (see Recommendation XVII A(3)).

FORESTRY:

The panel noted that indiscriminate exploitation of forest is going on in most countries without a policy on conservation and a corresponding reforestation programme. Where reforestation has taken place forests are being replaced by imported soft wood varieties (see Recommendation XI).

MINERAL RESOURCES:

The position of mineral resources in Africa was discussed. It was considered that manpower training in the field of exploration should be intensified.

In this regard the panel welcomes the proposed OAU project on the Training and Research Centre on Earth Sciences.

INDUSTRY:

In the field of industry the panel considered iron and steel as the basic material that can stimulate industrialization and thereby ensure transfer of technology. The level of industrialization need not be sophisticated. The panel made a number of recommendations contained under item XIII below.

HEALTH:

The panel was informed of the symposium on Bilharziasis held in Addis Ababa in 1971. The STRC is to obtain the report of this symposium for the panel.

MOBILIZATION OF EFFORTS OF SCIENTIFIC AND RESEARCH ORGANIZATIONS OR INSTITUTIONS OF HIGHER LEARNING IN OAU STATES

Mention was made of a French technique of stimulating development whereby within a national plan, key areas requiring special attention are identified by government for intensive effort in terms of financial backing. In this approach a scientist is appointed to direct development and to assemble staff that can contribute from universities, research institutes and industry. An example is the development of the digital computer in France, where the French government bore the risk of development by financing the project up to between 60 to 80% in capital outlay. Such projects after conclusion are turned over to industry (i.e. French industry) if they are successful for production. Sometimes repayment by industry is not demanded, in other projects industry repays development costs over a number of years to the government.

The important element in this practice is that for effectiveness a man is given power to plan the work and to draw up his team as he considers desirable in the interest of the project.

RECOMMENDATIONS

Recommendation: I

GENERAL

It should be a policy that in problems affecting African interests, OAU/STRC or member countries should be the prime mover and initiative should not be left to international organizations. It is better for these organizations to be approached by African governments on specific problems they want solved.

Recommendation: II

SOIL SURVEY

Each country should carry out soil survey on a suitable scale to determine soil capability. The Inter-African Soil Bureau should undertake a survey of soil scientists available in Africa to enable national governments requiring their services to be able to draw on them. African countries with sufficient scientific personnel should assist neighbouring African countries in this regard.

Recommendation: III

PRODUCTION OF NEW VARIETIES AND MULTIPLICATION

Each country should embark on studies on variety production in the crops of their interest. The experience of Zaire and Egypt in the use of irradiation for variety production should be disseminated among OAU countries. Suitable methods must be found for seed multiplication of proved high yielding varieties. The varieties produced should be tried in different ecological condition, as is done for example the OAU/STRC major cereal crops research (JP.26) and East African Community Cereal Research. These two Centres (Kinshasa and Cairo) and any other that may exist should be encouraged.

In regard to multiplication of varieties there is need for mobilization of African scientists. Certain areas of grain variety production need to be manned by nationals or, where these are not available, by scientists from other African countries. Information on work going on in this area in various research institutes should be collected by the STRC Executive Secretariat including existing publications in this area.

Recommendation: IV

PLANTING METHODS

There is need for mechanization in planting to ensure that planting of large acreage can be done within the most suitable seasonal period. Simple mechanical devices should be designed to aid planting. The number of extension workers should be increased to make for effectiveness in the application of modern techniques.

Recommendation: V

WATER RESOURCES AND UTILIZATION

There is need for studies of the rivers of Africa for water control purposes.

Methods must be found by combating the diseases associated with irrigation, E.g. malaria, bilharzia. The Panel noted that work is being done in these areas.

Recommendation: VI

LIVESTOCK DISEASES

It is essential to have African capacity to declare areas free of various livestock diseases to encourage inter-African trade.

Recommendation: VII

BREEDING AND BEEF PRODUCTION

Every effort should be made to increase the yield of beef through organized production techniques.

Breeding should be undertaken as an integral and important aspect of beef production by national boards rather than on a regional basis.

Recommendation: VIII

ANIMAL FEED

Pasture production or cultivation should be on the basis of deliberate effort to produce animal feed. Information should be collected and disseminated from the research institutes currently engaged in the work of pasture production. Seed multiplication of good variety grass for pasture improvement and multiplication must be undertaken in research centres and the seeds made available to other countries for further multiplication and cultivation. Grain feeding is an important part of animal husbandry and much the same effort is needed in this field as in the field of pasture multiplication and cultivation.

The existing institutes should be strengthened and encouraged to do more work.

Recommendation: IX

MEAT AND MILK PRODUCTION

It is recommended that cattle should be slaughtered at source and freezing should be the method of preservation for storage and transportation to the areas or countries where the meat is needed.

In general the panel recommends that breeding of cattle and goats be encouraged to increase meat and milk production.

Recommendation: X

FISHERIES

It is recommended that panel on oceanography, sea and inland fisheries be expanded to be representative of regions of Africa with the clear mandate to consolidate its efforts and identify and tackle problems associated with fisheries in Africa.

Recommendation: XI

FORESTRY

There should be formed as a matter of urgency an OAU/STRC Panel on Forestry to look into problems of conservation, exploitation and reafforestation, and forest products.

Recommendation: XII

MINERAL RESOURCES

The panel recommends that:-

- (i) an inventory of known minerals in Africa according to type, quality and quantity be drawn up and the rate of exploitation compiled.
- (ii) manpower training in the exploration field should be intensified.
- (iii) immediate efforts should be made either on national or regional co-operative basis to process, at least partially, some of these ores before exportation.
- (iv) the establishment of metallurgical laboratories to study the percentage of the pure metal extractable from an ore especially when new deposits are found.

Recommendation: XIII

INDUSTRY

The panel recommends that:-

- (i) African technologists be enpanelled by the OAU to study areas of natural resources that can be processed and also make a study of cost-benefit analysis to decide on the choice of field to be industrialized.

- (ii) Without iron and steel, development in other fields like agriculture, building industry, pharmaceutical industry might be hindered or at a high cost without a corresponding gain in know-how. There is therefore an urgent need to find a way of raising African international finance with government investment to establish iron and steel complexes in regions of Africa to meet the needs of the regions.
- (iii) The establishment of such complexes should in addition aim at the true transfer of technology to the African technologists, scientists and technicians.
- (iv) Industry should be persuaded to support research efforts in the universities and also get university departments involved in industrial research by giving part of their problems to the universities to solve with the necessary supporting fund.
- (v) The Nigerian experience on the Industrial Training Fund may be an effective way of generating capital for training and research. The Industrial Training Fund is derivable from levies (based on annual turnover) on industrial and commercial organizations as their contribution towards industrial training of national manpower. An industry that has organized training facilities of its own and which trains manpower is however compensated through a reduction in levy or by its non-payment depending on the quality and magnitude of its training programme. In Nigeria, the Fund is meant for the training of a wide spectrum of much needed middle-level manpower, both technical and commercial, and for supporting industrial training of graduates. Part of the Fund may be used for supporting worthwhile applied research projects in the universities.

Recommendation: XIV

HEALTH

The Panel agrees that:-

- (i) Regional co-operation and joint action are needed in the field of bilharziasis in view of the manner of the spread of the disease.

- (ii) Efforts at biological control methods of bilharzia should be intensified.
- (iii) In the field of tuberculosis, research workers should be brought together to exchange ideas on:-
 - (a) ways of effective treatment of the disease; and
 - (b) development of local drugs for treating this disease.

Recommendation: XV

CREATION OF FAVOURABLE CLIMATE IN OAU STATES FOR INNOVATION TO THE TECHNIQUES OF PRODUCTION

- (i) Popularization of science by the use of news media e.g. newspapers, television, radio etc... Scientists should make their work and their disciplines known through talks on and discussions of their works especially on aspects of their works that can assist the solution of problems of national interests.
- (ii) Legislation should be made in the various OAU States in respect of Patent Laws to enable scientists have protection of their discoveries in various fields. Such a law could lead to revenue being derived from discoveries.
- (iii) Scientists should be afforded the opportunity of dialogue with topmost political policy decision making body or persons in each state.
- (iv) There should be a good balance between the theoretical and practical content of scientific education. As much as possible in the teaching of science local examples should be used to illustrate the achievement of science and technology.
- (v) Government should embark on the establishment of Science Museums with good exhibits to be used for illustrations in teaching and also for popularizing the products and achievements of science and technology.

- (vi) Popularizing science through the involvement of youths in the application of science in popular fields. The Egyptian experience where science clubs are established as arms of popular youth clubs is worth mentioning. Youths are encouraged to build radios and other simple electronic devices using printed circuits, and transistors. For little amount youths can be guided to divert their youthful energy and inquisitive instincts to such fruitful pursuits.

Recommendation: XVI

MOBILIZATION OF EFFORTS OF SCIENTIFIC AND RESEARCH ORGANIZATIONS OR INSTITUTIONS OF HIGHER LEARNING IN OAU STATES FOR THE SOLUTION OF PROBLEMS WHICH ARE OF REGIONAL INTEREST OF AFRICA.

- (i) There should be a two way flow of personnel between universities, industry and government e.g. involvement of university men in industrial projects whilst universities should get experienced men from industry involved in teaching even if this can only be on short duration basis.
- (ii) The Association of African Universities be approached to make available to the Executive Secretary for information purposes records of their deliberations.

Recommendation: XVII

RECOMMENDATIONS ON SUITABLE RESEARCH AND DEVELOPMENT PRIORITIES IN OAU STATES

A. DEVELOPMENT PRIORITIES:-

Development priorities were considered on the basis of the need to improve agriculture and the essential supporting or ancillary industries, the need to produce other essential consumer goods and in order to update methods and increase production, the need to have iron and steel complexes in suitable areas in Africa.

1. Agriculture

The following areas of agriculture were considered to be of major importance to the development of agriculture from the point of view of increased productivity and conservation of agricultural produce:

- (i) Development of large farms either through organizing farmers with contiguous small holdings into a co-operative or through government active participation in large scale farming;
- (ii) Multiplication of new suitable varieties of seeds with better yield and improved nutritive value;
- (iii) Cultivation on an economic basis of such improved varieties and other crops;
- (iv) Mechanization of agriculture through the use of modern plants based on the co-operative concept and simple but effective mechanical devices for clearing and planting;
- (v) Innovating simple but effective storage facilities within the reach of the small farmers and the building of large ones like silos which can be used on a co-operative basis;
- (vi) Other crop preservation, e.g. preservation of edible tubers like yams, and fruit preservation (oranges, grape fruits, lemon, bananas, etc...);
- (vii) As a conservation method, extraction of vitamins from fruits and other suitable sources.
- (viii) Utilization of agricultural bye-products. By.-products like molasses should be used for the production of spirits, vinegar, perfumes and, with the addition of suitable wastes from other agricultural products, (e.g. cotton seed waste after oil extraction, groundnut cake after oil extraction, palm kernel cake after oil extraction etc...) animal feeds.

- (ix) Intensive effort in the training of extension workers some of whom should be actively engaged in farming in the midst of traditional farmers as an effective method of enlightenment as regards techniques. It should be stressed that the role of the extension worker is on the field rather than in offices.
- (x) Rapid expansion of sugar cane plantations for the processing of sugar to achieve self sufficiency.

2. LIVESTOCK

The following areas are considered of major importance:-

- (i) Animal breeding on an economic scale, especially the use of artificial insemination; Egyptian National Research Centre offers training opportunities in this field.
- (ii) Development of varieties of grass suitable as pasture, the multiplication of their seeds and the deliberate cultivation of pastoral lands;
- (iii) Increased production of different varieties of grain suitable as cattle feed and for other livestock;

3. FISHERIES

The panel notes with regret that fisheries had not in the past received the attention it deserves in most states and also that there appears to be an attitude of indifference on the part of some governments to the need to protect and conserve one of Africa's future major source of proteins i.e. the waters around the coast line of Africa which are at present being partially exploited by and for other foreign interests and needs.

Bearing in mind the remarks above, the panel urges immediate positive action in the following areas:-

- (i) Building of fishing crafts - e.g. boats, powered and manually operated, the acquisition of trawlers for fishing purposes around the shores of countries that can afford it;
- (ii) Building of berthing facilities for fishing boats;
- (iii) Extension of territorial waters. In this regard there is need to reactivate the recommendations of the CSA;
- (iv) Improvement of fishing techniques and mesh problems in fishing net;
- (v) Building of fish ponds to increase production;
- (vi) The conscious utilization of the impounded lakes of hydro-electric projects as fish breeding and production lakes;
- (vii) The improvement of traditional preservation methods by up-dating the techniques to modern industrial methods of preservation;
- (viii) Preservation of fish by freezing for wider distribution. Research is going on an irradiation method of preservation.

The panel suggested the expansion of the membership of the STRC Panel on Oceanography and Fisheries. The panel further recommended the establishment of a pre-investment co-operative project between the OAU States bordering the Red Sea for the purpose of developing the Red Sea for fisheries.

4. INDUSTRY

The areas considered to be of immediate and major importance are largely under chemical industry because of their need to develop agriculture and also produce essential consumer goods for building houses, foot-wear and educational materials.

(i) Chemical Industries

- (a) Pesticides e.g. the processing of pyrethrum and its by-products. Chemists should do more in the study of chemistry of natural products;

(b) Fertilizers - There is need for the production of fertilizers of the phosphate and ammonia base. The panel recommended the establishment of factories for production of the two types of fertilizers on the basis of inter-African financing, in other words the capital for the establishment of such factories to be contributed by African governments as investments in the venture. Such a venture should be large enough to cater for the needs of Africa and should be located in the States with super-abundance of the essential raw materials. The staffing for such venture could be inter-African. Examples of countries with large phosphate deposits are Togo, Morocco and Egypt, and those with petroleum gas are Nigeria, Algeria and Egypt;

(c) Ceramics and Cement

Ceramics industry should be nationally based but there should be a free flow of information on material properties and production techniques. There is need for development of a complex of cement factories in every nation. Where necessary arrangements for financing such projects could be on a bilateral or multilateral arrangements between African countries.

Development of cement from laterite and research on sand for glass industry should be actively pursued in most States.

(d) Leather and Leather Products

Africa produces substantial quantity of the world's leather and skins which should be processed including tannery. There should be established industry for the manufacture of leather goods, e.g. shoes, bags, etc. for local use and export.

In this regard, Egypt offers opportunity for training at the Egyptian National Research Centre. There is a short course, of 12 weeks duration.

(e) Paper

As much as possible every nation in Africa should establish paper industry but where this is not possible to obtain supplies from neighbouring countries which produce paper. Studies should go on in the use of waste products like bagase, rice stems, papyrus, bamboos, maize stems, sorgum stems etc... For good quality paper there should be conscious effort to grow imported soft wood varieties. The use of other local wood fibres should be looked into, in this regard a study should be made of the practice in the Chinese province of Taiwan.

(ii) Pharmaceuticals

The panel confirmed the recommendations of the panel on Medicinal Plants. The panel recommends the establishment of joint co-operative efforts in the manufacture of drugs in Africa.

(iii) Iron and Steel

The panel considered iron and steel as an essential and basic product for agricultural development, building and industrialization. The panel suggests the establishment of iron and steel complexes in strategic locations in Africa (strategy based on availability of raw material, power and technical manpower). The development of these complexes should be based on inter-African financing as suggested under manufacture of fertilizers.

(iv) Utilization of By -Products

Petroleum distillation residue and copper pyrites purification wastes should be used to produce sulphuric acid wherever possible. Sisal by -products should also be used as found suitable through research. A special note of warning on mining industry concerns the associated minerals from mining operations for specific metals. Feasibility studies should be conducted for the possible extraction of the associated metals. There is also need for vigilance to ensure that foreign prospectors are not tapping more metals than their licences or agreement cover or than they declare.

B. RESEARCH PRIORITIES

Among the areas requiring immediate attention of scientists as a means of advancing scientific knowledge and technology are as follows:

- (i) Research into new crops varieties;
- (ii) Studies in water requirements of crops to aid irrigation requirements;
- (iii) Research on fertilizer requirements of different soils;
- (iv) Research into food processing;
- (v) Research into prevention and curative aspects of foot and mouth disease;
- (vi) More research into high yielding and rich pasture strains.
- (vii) Research in the use of forest products in paper manufacture;
- (viii) Studies on medicinal plants of Africa and their utilization in drug manufacture;
- (ix) Research to continue the control of malaria, bilharzia and river blindness with special reference to biological control; current research in trypanosomiasis and tsetse should be strengthened.
- (x) Research into the production of vaccine for inoculation against various livestock diseases.

Recommendation: XVIII

JOINT AND CO-OPERATIVE PROJECTS IN THE FIELD OF SCIENCE AND TECHNOLOGY IN OAU STATES

1. Road Transport

There is an urgent need to develop international road links. Examples of essential areas are Lagos - Cairo (via Chad and Sudan), Mombasa - Lagos, Lagos-Dakar-Algiers, Lusaka-Cairo. Since these roads are essential for promotion of inter-African trade, they should be of such quality and strength as to be able to support road haulage of products among various African countries.

2. Air Transport

The panel is of the opinion that Air Transport is an important factor in inter-African trade both from the point of view of human mobility and also air freighting of produce.

The panel therefore recommends a meeting of African National Airlines at the request of governments to discuss how to increase inter-African communications especially along the East-West axis and the East-North East axis.

3. Telecommunication

The present situation of getting most African capitals through European capitals is deplorable. The panel believes that this problem is better tackled by first improving telecommunication links within sub-regions and later linking the sub-regions. For example the countries of each of the regions of East and West Africa could be linked through microwave links of the capitals. It is further recommended that radio communication should be intensified so that stations from all African countries can be received anywhere on the continent.

Television should be developed locally for educational purposes.

4. Power

Hydro-electric schemes should be as far as possible integrated and should cater for fisheries and irrigation wherever possible in addition to power generation.

There should be sharing of power between adjacent countries; to this end, there may be need for inter-state high-tension electrical grid system to aid this sharing. Certain countries should exploit their power potential fully with this sharing in mind. Ghana for example plans to export power to Ivory Coast, Togo and Dahomey, and Nigeria to Niger.

Wherever there is such co-operative effort in power utilization, whatever power is generated in each co-operating country could be fed into the inter-state grid system.

Guinea requires power for the development of her bauxite and iron ores. The panel believes that a project like this needs inter-African financing since exploitation of these ores would benefit Africa as a whole in the long run.

The STRC should assist countries in locating African capability for advising on projects for which interested nations with the suitable natural resource have no scientists and technologists.

5. Nuclear Power

There is an urgent need for Africa to get involved in the Nuclear technology even if this may be at peripheral but important areas like the use of radio isotopes in medicine, development of new crop varieties through irradiation, etc... There is need also for the building of additional reactors in one of Africa's research establishments, research institutes or universities, to acquire the technology of the utilization of nuclear energy for generation of power. The worlds' consumption of energy is rising steeply and sources of energy are being ruthlessly depleted. Natural gas and petroleum are being exploited at such a rate and on such a scale that in another two decades they may cease in importance as energy sources because of scarcity due to depletion. Nuclear energy will gain the ascendancy. The need therefore for Africa to preserve and conserve her energy sources is obvious. At the moment not only is the petroleum in Africa being tapped mostly by foreign interests at a fast rate (e.g. Nigeria, Algeria, Egypt), African countries themselves are utilizing as little as 0.01%. The other important energy source, uranium is also being tapped by these foreign interests. The danger is obvious that these power resources may be exhausted by the time African countries need them for their own technological advance. African countries with uranium deposits should therefore not permit exploitation of this resource by foreign countries. It must be noted that known deposits in Europe and America are being conserved whilst exploitation is greatest in Africa.

6. Documentation Centres

There is an urgent need for collecting and disseminating information about the scientific work carried out in different African States. Already the OAU/STRC has 3 Bureaux which do some documentation viz: Inter-African Bureau for Animal Resources (IBAR) in Nairobi, Inter-African Bureau for Soils (BIS) in Bangui, and Inter-African Phyto-Sanitary Council (IAPSC) in Yaounde.

The OAU should therefore prepare itself in co-operation with the UNESCO for the establishment of Science and Technology Libraries and Documentation Centres at least initially on a regional basis. Such institutions would serve as depositories for current scientific development throughout the world through acquisition of the right kind of international journals.

There is need for the establishment of Research Notes and Records covering all the fields of science and technology on the research results done by African scientific workers which could be circulated among scientific establishments and institutions.



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