

# **SUSTAINABLE SOURCING AND UTILIZATION OF RAW MATERIALS FOR NATURAL PRODUCTS DEVELOPMENT**

**BY**

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## 1.0 INTRODUCTION

Sustainable sourcing and utilization of raw materials is all about:

- i). extraction of valuable products from the available resources of nature and its judicious utilization for the benefit of mankind, and continuity of life on earth.
  - ii). It is about taking from the nature what we need to live on today, without jeopardizing the potentials for other people to meet their various needs in the future.
- Going by these definitions, it is right to say that process of raw materials sourcing must guarantee safety and wellbeing of the people. Also the wellbeing of the physical environment, as well as the biological species and their natural habitats.

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- Although the sector is known to have strong comparative advantage in terms of local content and availability of resources, it still remains very weak and contributes little to the National GDP.
  
  - The component industries are weak due to myriad of challenges such as:
    - the poor state of the nation's infrastructure, which imposes high cost on production.
    - weak technological base and support and low level of innovation which lead to production of low quality products / non-competitive goods.
    - Poor business environment, lack of investments and low capacity utilization, etc.

### ***In a wider scope -***

- Sourcing of raw materials refers to the processes of procuring, finding, evaluating and engaging suppliers of goods and services for purpose of production / industrial manufacturing.
- These processes aforementioned, encompass every activities or practices involved in the chain of “production and supply of raw materials”, as well as their impacts to the immediate communities, natural environment and the ecosystem.
- The ultimate goal however, is to ensure sustainability and constant provision of raw materials (i.e. right feedstock) that are deemed fit for industrial manufacturing.

## 1.1 The Nigerian Natural Product Industry

- Natural product industry is very diverse in nature and cuts across the following sectors:
  - Food and beverages
  - Drugs and pharmaceutical (Natural medicine)
  - Paints, dyes and Pigments
  - Wine, spirit and distillers
  - Paper and pulp
  - Leather products
  - Soap, perfume and personal hygiene, etc
  
- Considering the huge potentials for growth and development, the sector is one of the foremost segments of Nigerian industries, crucial for employment generation, wealth creation and raising the quality of life of people.

### 1.1.1 Major Classes of Raw Materials Utilized by the Industry

1. **Primary Raw Materials:** these are unprocessed raw materials directly obtained in their natural states with or without tangible value addition e.g. plant leaves, roots etc;
2. **Secondary Raw Materials:** Semi-processed raw material that has just received minimal or sufficient value-addition e.g. leave powders, grain flour; and
3. **Tertiary Raw Materials:** these are somewhat finished products at a particular level of production which may find other uses in different industries as starting materials or ordinary ingredients e.g. processed natural extracts such as biological sweeteners, flavors, beta-carotene;



**Table 3:****UNIDO Illustrated List of some selected Medicinal Plants (Raw Materials) for use in the Natural Medicine / Pharmaceutical Industries**

<b>S. N</b>	<b>Medicinal Plant Species (Family)</b>	<b>Relevant parts (Raw Materials)</b>	<b>Specific Products / Uses</b>
1.	<i>Artemesia annua</i> (Compositae)	Whole plant	Artemisinin (Antimalarial)
2.	<i>Atropa belladonna</i> (Solanaceae)	Leaf, roots	Tropane alkaloid (Anticholinergic)
3.	<i>Cassia acutifolia</i> (Leguminosea)	Leaves, pods	Senosides A & B (Laxative)
4.	<i>Azadirachta Indica</i> (Meliacea)	Bark, leaves, fruits, gum, exudates	Neem oil, nimbidin (Antifungal)
5.	<i>Catharanthus Roseus</i> (Apocynaceae)	Leaves, roots	Vinblastine/ Vincristine (Anticancer)
6.	<i>Carica papaya</i> (Carcaceae)	Fruit latex	Papain (Protein Digesant)
7.	<i>Cephadlis ipecacuanha</i>	Roots	Emetine, cephaelin (Antiamoebic, Expectorant.
9.	<i>Datura Spp</i> (Solanaceae)	leaves	Atropine, Hyoscyamine, Hyoscine, Scopolamine (Anticholinergic)
10	<i>Digitalis Lanata</i> (Scrophulariaceae)	Leaves	Digixin, Lanatosides (Cardiotonic)
11	<i>Mentha Spp.</i> (Labiatae)	Whole Plant	Essential oil, menthol (Carminative)
12	<i>Rauwolfia Spp.</i> (Apocynaceae)	Roots	Reserpine, Ajamaline (Hypnotic, Sedative, Hpertensive)
13	<i>Podophyllum Hexandrum</i> (Berberidaceae)	Tuber	Podophyllum, podophyllutoxin and derivatives (Anti-tumor)

Source: RMRDC (Techno-Economic Survey Report)

## **2.0 Sourcing of Raw Materials for the Natural Product Industry in Nigeria.**

### 2.1 Method of Sourcing for Raw Materials in the Natural Products Industry

- Raw materials can be sourced from various sources - primary producers, intermediate suppliers, anonymous commodity markets etc
- Approaches popularly employed by the Nigerian Industries include:
  - i). Direct sourcing
  - ii). Indirect sourcing,
  - iii). Combination of (i & ii).

## 2.1.1 Direct Sourcing

- This is a process of sourcing industrial input directly from the local producers, i.e. a farmer, farmer's organization and other primary industries, etc.

Primary industries – create the basic materials for use in other industries. They may be involved in major businesses such as :

- i). Agricultural farming: – cultivation, growing and harvesting of crops (e.g. food crops, medicinal plants etc), as well as animal rearing.
- ii). Wild-Crafting: – sourcing of raw materials input from the bushes, forests or an uncultivated fields) and
- iii). Others: - horticulture, aquaculture, fishing, mining, agribusiness etc.

## ***Direct Sourcing: Basic Requirements for Industries.***

1. Industries must have established raw materials purchasing department (in line with “quality system organization”).
2. Must have adequate structure for monitoring the specifications of raw materials to ensure consistency.
3. Robust record keeping and mechanism for self-auditing / self-assessment.
4. Qualified personnel who are knowledgeable about natural resource management and conservation of nature.
5. Adequate level of manpower. Good provision for regular training.

### ***2.1.2 Indirect Sourcing***


- Method of sourcing of raw materials through an agent.
- Supplier's code is always required – to provide the specific terms and conditions for raw materials specification / standard.
- Raw materials supply could be outsourced to an agent through the various means stipulated below:
  1. Contractual Appointments (with farmers or corporate bodies).
  2. Use of Cooperative Societies.
  3. Individual Suppliers.

## ***Qualities of Good Sourcing Agent***

1. Should be a qualified (trained) person and knowledgeable about the job.
2. Should have the basic information about quality system / industrial manufacturing.
3. Should possess good level of experience in raw materials processing, handling and harvesting practices
4. Should be compliant and able to adhere to the basic guidance, ethics and rules in good agricultural / natural conservation practices, etc.
5. Ability to assess quality of raw materials, ensuring that right specifications are supplied.

## **2.2 Sustainability of Raw Materials Supply Vs Natural Resource Management**

- The Big Questions
  1. What could make raw materials supply unsustainable?
  2. What implication could the production or supply chains of raw materials have on the immediate environment, the community, region and rest of the world?
  3. What considerations do you give to the method of processing / supply of raw materials; how the resultant activities affects the quality of life for both the present and future generation.



4. What level of monitoring / control is available for – your present activity in raw materials sourcing and how these could affect the climate, air, water, soil, fawn and fauna (i.e. the vegetations, animals, biological species etc).

5. How well have you tried to balance the following:

- the social (people and communities), economic (money and jobs) and environmental (land, water, air and living things) and other factors, to make sure that future generation are not shortchanged.

- The ultimate goal however, is to leave a better natural environment than what we have today, for the people of future generation.



## Unsustainable Sourcing of Raw Materials in the Natural Medicine Industry: the Major Implication

- For the past decades, the demand for medicinal plants in the international market has grown significantly;.
- Notwithstanding the market growth, the raw materials supplies to the “producer companies” are often times traded as bulk commodity, without adequate concern for environmental impact assessment.
- Successive failures to address these problems, or at least implement the necessary environmental oversights in raw materials sourcing has produced limited benefits for both the primary producers and their immediate communities.

## Boosting the Supply of Medicinal Plant Resources through Agricultural Farming / Domestication

What is domestication?

- The practice of cultivation of plant or production of alien biological resources in a farm formation, rather than picking directly from the bush.

### ***Advantages***

- i). Adequate production of raw materials
- ii). Reliability of its supply
- iii). Consistency of quality
- iv). Good market control etc

### ***2.2.1 The Negative Impact of Unrestricted Human Exploitation***

- Life on earth is facing historical crisis due to unsustainable high consumption lifestyle of the new age, reckless overgrazing and unrestricted human activity on the natural environment.
- The mass depletion of the forest reserve by the subsistent rural population in many developing countries has resulted to
  - dilapidation and imbalance in ecosystem
  - scarcity of raw materials
  - extinction of biological species, etc
- All these problems may be linked in one way or the other to unethical and overzealous activities of the forest users who disregard the need for best practices.

## Extinction of Biological Species: Implication on the Nigerian Natural Medicine Industry.

- Extinction is an irreversible process, and can be referred to as one of the gravest crisis of the biodiversity.
- In Nigeria, over 80 percent of the “medicinal and aromatic plant raw materials” used by the herbal drug industries are sourced directly from the wild.
- Today many of the viable species are rapidly disappearing from the forests, going into extinction.
- This has great implication to humanity, especially the rural poor who depend totally on natural vegetation for food and healthcare needs.

Extinction of Biological Species in Nigeria is traceable to unsustainable / negative human activities such as:

- Vegetation clearing (owing to rapid / unplanned urbanization)
- Excessive human subsistence – (in search of food, medicine and raw materials for industries)
- Reckless overgrazing
- Destruction of the natural habitat by **bush fire**
- Uncontrolled wild crafting and bio-prospecting
- Industrial pollution and emission of green house gases
- Unregulated lumbering / forest exploitation
- Wild game poaching etc

## ***Summary:***

Negative human activities on biodiversity has the following attendant problems:

- Scarcity of basic raw materials
- Loss of biological species in the forest
- Deforestation, desertification and desert encroachment
- Climate Change, global warming, rising sea level and its attendant natural disasters.
- Depletion of Ozone layer and consequent environmental / health hazards.
- Environmental degradation
- Soil erosion and other ecological problems

### ***2.2.2 Maintaining Balance between Raw Material Exploitation and Conservation***

- To have a sustainable balance in raw materials exploitation and conservation the following are required:
  - i. Establishing strong cultural, social and economic commitment towards better use of resources i.e. discouraging aggressive actions / bad practices often displayed by the ignorant users;
  - ii. Adequate regulation – sound conservation practices to be enforced among the basic providers of raw materials.

### **2.2.3 Why conserve Natural Resources?**

- The ecological arguments for conserving nature's reserve are based on the premise that man needs to preserve the biodiversity in order to maintain life support system on earth.
- Immediate need for conserving the natural resources impinge on the following:
  - i. Sustainability of life on earth
  - ii. Ecological concerns
  - iii. Economic reasons
  - iv. Ethical and Aesthetics reasons



### **3.0 Local Sourcing of Raw Materials in Nigeria**

#### ***Prospects***

- Nigeria has large population, fertile soil and sizable land mass covered with wide varieties of vegetations / biodiversity. It is possible to source locally all the raw material components needed for the survival and development of the country's industrial manufacturing sector.
- Available records show that, only a very few raw materials are sourced locally, leaving the rest vastly under-developed and untapped.
- The situation is beginning to change now, as the country's focus on agriculture is very much renewed with different governments announcing different agricultural development programmes.

### **3.1 Challenges**

The Challenges of sourcing for relevant raw material input locally in Nigeria are quite enormous and these include:


- i). Lack of appropriate information on raw materials sourcing due to the high financial outlay in information / data gathering and documentation.
- ii). Lack of power supply which has seriously affected the industry;
- iii) Inadequate infrastructures; .
- iv). Inaccessibility to fund with low interest rate for investments;

## ***Challenges cont'd***

- v). Lack of appropriate technology, equipment / right machinery for raw materials processing and storage
- vi). Lack of proper indigenous technologies for harnessing, transforming and putting into gains the numerous potentials endowed by nature in our local environment
- vii). Low level of research and development (R&D) activities due to poor funding of research and development.
- ix). Weak institutions, inadequate manpower to stimulate and sustain growth in the downstream raw materials processing sector.
- x). Policy instability and discontinuity. ,

## **3.2 Local Raw Materials Sourcing: RMRDC Experience**

- RMRDC since inception has been making untiring efforts towards promoting the development and utilization of Nigeria's natural resources for sustainable industrial growth. RMRDC has been able to record the following achievements:
- Boosting the supply of agricultural raw materials for industrial use through production and multiplication of improved seeds and seedlings;
- Establishment of Raw Materials Information System (RMIS). This provides valuable information to investors, industrialists, researchers and interested persons on the availability of raw materials, location, reserve estimate etc;

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- Promoting the development of indigenous technology towards harnessing, exploiting and processing the nation's abundant resources;
  - Sponsoring of R&D activities for enhanced raw materials utilization;
  - Provision of technical support services and promotion of new resource based investments through joint venture / partnership with industrialist-investors / state governments; and
  - Techno-economic survey to determine resource availability and depletion.

### **3.2.1 Some Recent Collaborations of RMRDC with other Agencies in Developing the Raw Material Base of the Natural Product Industry**

<b>Agencies</b>	<b>Activities</b>
RMRDC / NNMDA, Lagos	<b><i>Ethno-botanical Survey and Identification of Medicinal, Aromatic and Pesticidal Plants (MAPPs) for used in the Six geopolitical Zones of Nigeria and 7 Dedicated Areas</i></b>
<ul style="list-style-type: none"><li>▪ <b><i>Specific Objectives:</i></b><ol style="list-style-type: none"><li>1. To utilize appropriate technologies to identify, document and create standard database of all the MAPPs used in Nigerian Traditional Medicine (TM).</li><li>2. To preserve Knowledge of TM and enhance opportunities in R&amp;D.</li><li>3. Promote the utilization of medicinal plants as raw materials for pharmaceutical manufacturing / TM industry.</li></ol></li></ul>	

Agencies	Activities
RMRDC / ABU, Zaria	<p><b><i>Development of Moringa - based Water Treatment Plant (10,000 liter pilot plant steel model for treatment of portable water for the poor communities).</i></b></p>
<ul style="list-style-type: none"> <li>▪ This water plant was commissioned in September, 2011 at Samaru cCommunity, Zaria, Kaduna State.</li> <li>▪ There is ongoing Collaboration with NAPEP for multiplication of the project and provision of portable water for the rural communities in Nigeria.</li> <li>▪ <b><i>Specific Objectives</i></b> <ol style="list-style-type: none"> <li>1. Utilize feedstock developed from <i>Moringa oleifera</i> seedcake for processing portable water.</li> <li>2. Substituting Moringa as perfect replacement for Alum.</li> <li>3. Reduce the incidence of water borne diseases, epidemics and other public health problems caused by poor water sanitation</li> </ol> </li> </ul>	

Agencies / organization	Activities
RMRDC, STEP-B, NABDA, NIHORT, NACGRAB, FUMMAN Agricultural products Nig. Ltd, Niger Resources Ltd. And others.	<b><i>Promotion of the Fruit Juice Concentrate Industry</i></b>
<p data-bbox="179 401 1561 544"><i>The project commenced in 2011 under STEP-B world Bank support for “sustainable production and processing of tropical fruits into fruit juices, concentrates and allied products in Nigeria”.</i></p> <ul style="list-style-type: none"> <li data-bbox="179 615 639 651">▪ <b><i>Specific Objectives</i></b> <ol style="list-style-type: none"> <li data-bbox="179 668 1416 704">1. Sustainable provision of tropical fruits and allied products in Nigeria.</li> <li data-bbox="179 721 1818 801">2. Develop necessary capacities in the art of production, processing and utilization of fruits and allied products.</li> <li data-bbox="179 818 1779 898">3. Promote the production of improved planting materials affordable to small and commercial farmers in Nigeria.</li> </ol> </li> <li data-bbox="179 972 556 1008">▪ <b><i>Achievements:</i></b> <ol style="list-style-type: none"> <li data-bbox="179 1025 1605 1115">1). Installation of Temporary Immersion Bioreactor System (TIBS) at NABDA, NIHORT and NACGRAB. Upgrading of the Tissue Culture System has also been done.</li> <li data-bbox="179 1132 1653 1222">2). Mass production of planting materials of citrus, banana, mango and pineapple (over 20,000 seedlings of pineapple have been mass produced for uptake at reduced price.</li> </ol> </li> </ul>	



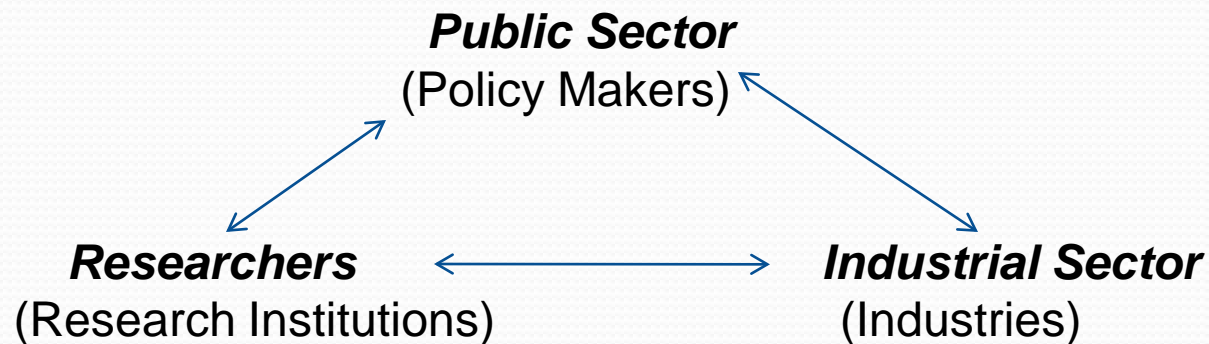
Agencies	Activities
RMRDC, NLPD, USAID – Markets and FCDA	<b><i>Mini Dairy Processing Plant at Paikonkore, Gwagwalada Area Council, FCT.</i></b>
<ul style="list-style-type: none"> <li>▪ This Project was commissioned in 2009 (milk collection centre of 1000 liters capacity utilization).</li> <li>▪ Developing the indigenous dairy industry in Nigeria will provide substitution for the importation of milk and milk products indiscriminately imported into the country</li> <li>▪ <b><i>Specific Objectives</i></b> <ol style="list-style-type: none"> <li>1. To Promote value addition in dairy development in FCT</li> <li>2. Promote skill acquisition and management in dairy production</li> <li>3. Promote transfer of technologies for adoption by the communities for improved productivity</li> <li>4. To improve the standard of production of dairy using modern tools and equipment</li> </ol> </li> </ul>	

## Other Collaborations:

Agency	Activity
a. RMRDC / FIIRO	Beniseed Oil Processing Plant
b. RMRDC / NARICT	i. Neem-based Fertilizer Plant ii. Essential Oil Pilot Plant
c. RMRDC / Ekiti State Government	Sericulture Development
d. RMRDC / Kogi State University	Cashew Processing factory
e. RMRDC/ UNIMAID / NIHORT Okigwe / FRIN Ibadan	-Gum Arabic ( <i>Acacia senegalensis</i> ) -Garcina kola (Kola nut) - Khaya Ivorensis; and other Economic trees
f. RMRDC / WINROCK Int. USA.	Honey processing
g. RMRDC / Nigerian Institute of Oceanography and Marine Research (NIOMR)	Fish Smoking Kiln

## 4.0 Sustainable Sourcing and Utilization of Raw Materials for Natural Products Development in Nigeria: The Way Forward

- Improving the agricultural system (sustainable agriculture), encouraging domestication and industrial-scale production of raw materials and bio-businesses.
- Adaptation of new technologies, most especially, in the areas of biotechnology and its applications.
- Enhancing the linkages / Interaction between government (the policy makers), Industries and Researchers, as demonstrated in the triple helix structure below:



- Documentation of new species / biological resources in the wild. Study of species and their natural habitat
- Natural Conservation. Creation of adequate policy and regulations to protect the environment, endangered biological species as well as other important sections of the biodiversity
- Training the next generation scientists on how to conserve the available local resources. Building capacity and conservational skills among the local people and primary producers of raw materials.
- Re-invigorate and refocus on science and technological innovation (STI) and R&D in both tertiary institutions and pharmaceutical industries to stress innovation and knowledge-based product development and services.

## Conclusion

- The natural ecosystem and biodiversity are constantly being destroyed and depleted as man persistently exploits his environment in search of food, energy and raw materials for sustainable industrial development.
- This prevailing search and exploitations of raw materials is an unending process taking into account the increasing human population on earth and the attendant pressure on available resources to support man's existence.
- It is therefore very imperative to seek new ways of making available the basic raw materials e.g. through renewable sources such as agriculture, without much distortion of the natural ecosystem.
- Our natural environment has to be protected and relevant laws adequately enforced. Without adequate balance in natural resource exploitation, mankind would be faced with more grievous problems in the future. Presently the issue of world-wide deforestation and global climate change are already beginning to torment life on earth.



**Thank You for listening**

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