

**Biotechnology Policy**  
**Government of West Bengal**



सत्यमेव जयते

**Department of Biotechnology**  
**Government of West Bengal**  
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## PREAMBLE

Biotechnology(hereinafter will be called BT as far as practicable), globally recognized as a rapidly emerging and far-reaching technology, is aptly described as the “technology of hope” by many for its promise of food, health and environmental security and sustainability. The recent and continuing advances in life sciences clearly unfold a scenario energized and driven by the new tools of biotechnology. Biotechnology can deliver the next wave of technological change that can be as radical as and even more pervasive than that brought about by IT. Employment generation, intellectual wealth creation, expanding entrepreneurial opportunities, augmenting industrial growth are a few of the compelling factors that warrant a focused approach for this sector.

There are several social concerns that need to be addressed in order to propel the emergence of biotechnology innovation in our State such as conserving bio-resources and ensuring safety of products and processes. Government and industry have to play a dual role to advance the benefits of modern biotechnology while at the same time educate and protect the interests of the public. Wide utilization of new technologies would require clear demonstration of the new added value to all stakeholders.

### **1) Overview : The Status and Possibilities of Developing Biotechnology Sector in West Bengal**

The potential of developing Biotechnology based industries in West Bengal is great. There are several highly competent national and state research Institutions, Central and State Universities, Agricultural Universities and institutions, Engineering & Technology Institutions, Medical and Health related research, academic, clinical and public health Institutions, IT infrastructures and Industrial R & D, which together can represent different sectors of biotechnology, and can robustly contribute towards the delivery of BT products (a list of such institutions is provided in Annexure 1).

Furthermore, the State Government of West Bengal is fully committed in its efforts for socio-economic improvements of society, and has identified Biotechnology as one of the most potential tool for achieving this goal. The State intends to promote biotechnology sector by building appropriate image, encouraging entrepreneurship, strengthening organizational collaborations and partnerships and practices.

BT is a knowledge intensive sector and this state is proud of producing relevant state of the art knowledge. Presence of Bengal and its diasporas can be easily identified, specially within the knowledge generation parts of BT sector, at both national and global level. The universities and research institutions located within the State are greatly contributing towards this goal. The strategy to develop a viable and vibrant biotechnology based industry, economy and a beneficiary social sector will depend on focus and attention in bringing various

differentiated and specialized knowledge, skills, management, and investment partners together.

The current policy of BT in West Bengal State is to bring this essential developmental agenda into focus and facilitate its translation for the inclusive benefits of this state. The constraints and challenges which hinder such development will be identified and rectified. Concerns, if any, will be addressed and resolved in a democratic and transparent manner.

### **1.1 Mission**

The mission of Government of West Bengal in BT is:

- To bring BT from laboratory to land as an inclusive developmental agenda
- To promote, support and facilitate the overall development of both traditional and modern Biotechnology in the State, including livelihood development programmes
- To provide institutional, legal, financial and policy support.
- To facilitate networking among stakeholders at Regional, National and International level
- To create scientific awareness in order to grow an ethical acceptance of the applications of biotechnology among the masses
- To undertake any other suitable option(s) in order to make the abovementioned missions successful and sustainable

### **1.2 Vision**

The BT is code based and it works from bottom up. It will help us to realize far-ranging, inclusive fitness of man and its environment. It will help us create a healthy, disease free, hunger free, nutritionally secure society living in safe and clean environment. It will foster and ensure holistic welfare and progress for all citizens of this State.

## **2) Broad Objectives :**

- 2.1 To bring in related industries and services of this growth industry and appropriate business model.
- 2.2 To map, conserve and sustainably use bio-resources, particularly those which are unique to the state.
- 2.3 To encourage and facilitate introduction of BT to strengthen the economy of the state from grass-root level.
- 2.4 To encourage agro-ecological practice and link them with BT, and its knowledge base.

- 2.5 The animal and fisheries BT has a vast need and scope for development in this State.
- 2.6 To encourage utilization of BT in public health initiatives, low cost diagnostic tests, and preventive measures
- 2.7 To facilitate energy security through biomass and other innovations, using fallow lands for bio-fuel plant cultivation.
- 2.8 To promote application of BT for bioremediation of polluted and contaminated sites.
- 2.9 To encourage existing BT departments, institutes, and public bodies to extend their public/social outreach programs, in order to increase awareness of BT on a grand scale and regular basis.
- 2.10 The marine resource of the vast coastal areas and specially the Sundarbans Mangrove bio-resource will be explored, identified and sustainably exploited. The state will strive to built-up a dedicated marine science and BT center, which is of national importance, through national BT mission. This centre may be chosen anywhere around the vicinity of Sundarbans.
- 2.11 To seek the help of National BT Mission, as and when required, in order to establish a dedicated National BT centre in West Bengal towards this end.

**2.12. The important Thrust Areas of Present Biotechnology Policy, as determined are:**

- **Agricultural Biotechnology;**
- **Healthcare Biotechnology;**
- **Environmental and Community Biotechnology.**

**3) Other Thrust Areas :**

1. Natural Resource Management (Agri and Horticulture, Forestry)
2. Animal Resource Development and fisheries
3. Marine Biotechnology
4. Pharmaceutical and Health care
5. Enzyme & Chemical Industry
6. Genetics and Genetic Engineering
7. Bioinformatics
8. Energy and Environment
9. Biotechnology for Societal and Community Development
10. Additional Common Sectors:
  - a) Biotechnology Education, Training, Entrepreneurship promotion
  - b) Biotechnology Park, Clusters and incubators
  - (c) Societal, Ethical, Public Interface & Regulatory Authority

### **3.1 Agricultural BT**

The key activities in agriculture biotechnology would be increasing productivity from land by enriching crop specific, microbial community; selection and developing crops resistant to biotic and abiotic stress, molecule based selection and more availability of quality seed and planting material, developing value added products, developing Bio-fertilizer & Bio-pesticides and Integrated Pest Management (IPM). BT appropriate for achieving these goals will be promoted. The recommendations of West Bengal State Agricultural Commission, 2009, and its resolutions on the inappropriate nature of GM foods and crops, and proposed alternatives may be taken as guidelines.

Development of Horticulture and Forestry using tissue culture and clonal propagation will be a priority area for income generation and employment.

The State is rich in biodiversity of crop, vegetable, fruits, flower and other plant resources. The state will strive to link and develop programs in genetics and genomics with seed banks, seed exchange, seed improvement activities, which will be made popular among farmers. The farm based innovations in BT will be developed to protect farmer's right in all such common goods.

### **3.2 Animal resource development and fisheries**

Goal of Animal biotechnology task force will be to scientifically link upstream and downstream steps for overall growth including quality improvement in this area. This will need a sustained proactive role. The expertise and human resource available within the state will ensure its success.

The production, availability and shelf life of animal feed, fodder, development of nutritionally rich, high protein fish, prawn, and alternative nutrition source, improving the health of productive animal through BT based disease control mechanism and tools; and developing value added products are the part of this mission. The state would focus on dairy animals, marine fisheries, aquaculture, prawn and sea foods etc. This sector is a very important part of our food and nutrition program.

### **3.3 Marine BT**

West Bengal is highly rich in marine biodiversity and natural resource. Apart from a coast line, it is blessed with the Sundarban Mangrove. The main activities in marine biotechnology, would be to screen marine resource for new molecule and active compounds, deep sea and interface niche bio-prospecting, conservation of marine bio-diversity, extraction of value added products and utilization of marine bio-mass etc. The state would

focus on conservation and sustainable use of Sundarban mangrove, sea weed and marine micro-organisms. **The Government of West Bengal will strive to establish a National Centre on Marine Biology and Biotechnology, with possible support from DBT, GOI.**

### **3.4 Pharmaceutical and Health care & Biotech-based Industries**

The key activities in Pharma and Healthcare would be to invite new farms, and encourage existing companies to develop of diagnostic kits and accessories, therapeutics and monoclonal antibodies, using lead and new molecules generated by the cutting edge research, new technologies, genetic diagnostics and contract research etc.

### **3.5 Enzymes and Chemical Industry**

The key activities in this sector will be to bring in Industrial level enzyme production, biotransformation, and biochemical engineering and processing as a new age chemical industry. It will help to develop Green Chemistry, which is environment friendly, and zero-waste. The detergent and other industries in India have high demand for these BT products.

### **3.6 Bioinformatics**

Biology is coded knowledge, and information packaging and flow is its central organizing principle. In modern BT, genomic information, database and IT are intricately related in a single network. Volumes of data are generated during genome sequencing, protein analyses and other analytical works. These database has to be decoded and used in a wider platform for proper use in other fields of biotechnology. This is particularly true for designing new drugs and molecular medicine.

Bioinformatics will play a key role in the future of genomics, proteomics and all sorts of biotech education and industry. West Bengal has a good Institutional foundation for Bioinformatics, which needs some scaling-up and to make it ready for BT industry. Kolkata and West Bengal have one of the largest concentrations of highly trained manpower in the country in these fields, both in the biosciences and in IT and hence the optimal utilization of this human resource can make West Bengal an ideal bioinformatics hub at regional, national, as well as international level.

### **3.7 Energy and Environment**

The human civilization is now facing a major challenge in the areas of Energy and Environment. Exploitation of renewable source of Energy from biomass is one area where BT shows great potential. Generation of Energy from biomass and waste

materials using BT is another area which needs to be improved and exploited. Other Green Energy initiatives will be encouraged in BT. Some key activities in environment biotechnology would be in tandem with Agricultural BT, such as genetic conservation of Biodiversity, Germplasm banks, Gene banks. Another set of environmental BT will run in tandem with Industrial BT sector. Its aim will be developing bio-indicators/bio-sensors, bio-remedies for effluent and industrial as well as medical waste treatment, generating value added products from waste etc.

### **3.8 Biotechnology for Social and Community Development**

The extension of modern biotechnology for more robust use of in the precincts of traditional biotechnology is veritably possible. The admixture of traditional and modern biotechnology will ultimately become the appropriate technology of the future in rural areas. This has the possibility of becoming the fountainhead of scientific innovation for the livelihood generation of the rural poor. This also requires support from the people's representatives. For that, all out awareness generation programmes will be undertaken.

Additional Common Sectors are related to BT education and awareness, BT units, BT regulation, and monitoring the whole program.

1. The general mandate of these common areas will be to accentuate the strategic programmes, catalyzing synergy and innovation
2. The State for promotion of Biotech Industry will follow the key Elements and principles spelled out in National Biotechnology Development Strategy, Government of India in 11<sup>th</sup> and forthcoming 12<sup>th</sup> Five-year plans
3. The State will promote critical awareness regarding Biotechnology and Genomics through print and other media including films
4. **The state will retain its own regulatory authority in BT sector, in addition to any national BT rule, regulations or law. As BT activities interface with state subjects, such State BT regulatory authority will be necessary.**

#### **4) Management & Regulation**

As BT integrates many traditional as well as new and emerging techniques, the Management of state BT mission is challenging and crucial. The Sector based thrust area is an attempt to make an integrated network of function. An appropriate management model will be constituted to take this task ahead, and it will be evaluated and

modified (if needed), from time to time. The Management Model, in addition to already spelled principles and guidelines will encode following norms:

- a) Environmentally sound and socially responsible management of BT
- b) Increased availability of food, feed and renewable raw materials
- c) Meeting rural, urban, and semi urban needs, and have appropriate outreach model for that
- d) Assisting national and International Collaborations
- e) Milestones and roadmaps will be set up from time to time for internal and external evaluation
- f) Data and Information will be kept well organized, up to date and open accessed
- g) **State will take initiative to establish a National Centre for Risk Assessment, Risk Management, and Communication of such Risk of GMO and GM-food in West Bengal with support from Central agencies (DBT, DST, DSIR, ICMR, ICAR etc). This centre will be interdisciplinary in nature, and will involve both basic research as well as applications.**

## **5. Incentives**

A separate policy regarding the offer of various incentives against capital investments in BT-based Industries in the State is being framed.

### **: Appendices:**

1. A List of Existing Institutions in the State
2. A list of existing or proposed BT parks in the State

## **Appendix-I**

### **LIST OF EXISTING RESEARCH AND TEACHING INSTITUTIONS IN WEST BENGAL**

National Institute of Biomedical Genomics (NIBMG)

University of Calcutta

Presidency University, Kolkata

University of Kalyani

Jadavpur University

Bidhan Chandra Krishi Viswavidyalaya (BCKV)

University of Burdwan

Viswabharati University

University of North Bengal

West Bengal University of Health Sciences

West Bengal University of Technology (WBUT)

Uttar Banga Krishi Viswavidyalaya

Vidyasagar University

Indian Institute of Technology, Kharagpur (IIT)

Bose Institute

Indian Institute of Chemical Biology (IICB)

Saha Institute of Nuclear Physics (SINP)

Indian Statistical Institute, Kolkata (ISI)

Institute of Postgraduate Medical Education & Research (IPGMER)

Indian Association for Cultivation of Science (IACS)

Central Research Institute for Jute & Allied Fibres

Central Inland Fisheries Research Institute

National Institute of Cholera and Enteric Diseases (NICED)

Calcutta School of Tropical Medicine

St. Xavier's College, Kolkata

## Appendix-II

### Kolkata Biotech Park

This is a ten storeyed building situated at EN 24, Sector V, Salt Lake, Kolkata 700091 having a built-up area of 38,000 sq. ft and has been procured by the West Bengal Biotech Development Corporation Ltd (A Government of West Bengal Undertaking) in 2011.

1. A State of the Art modern incubation centre equipped with the following instruments has been established in this building. This facility is being used as the "Common Instrumental Facility" by various Companies which have taken space in this building. There are several ultra modern equipment (mainly genomics) which have been accommodated in this facility. These are:

1. Solid 4 Genome Analyzer
2. 3500 Genetic Analyzer
3. Polyplex Oligonucleotide (Primer) Synthesizer
4. Step One Plus Real Time PCR
5. C1000 Gradient PCR
6. 24301-93UV-VIS Spectrophotometer
7. iMark Microplate Absorbance ELISA Plate Reader
8. Molecular Imager Chemi Doc XRS+ System Gel Documentation System
9. Trinocular Inverted Microscope with Phase contrast,
10. Multifuge X3R, Table top Refrigerated Centrifuge
11. Avanti JE, Floor Model Refrigerated Centrifuge
12. Galaxy 170R, Carbon-dioxide Incubator
13. Premium U410, Vertical -85°C Deep Freezer
14. AKTA purifier 100, Fast Protein Liquid Chromatography System

This facility under one roof is unique in the State. This facility can handle most of the complex researches in genomics. A few proteomics instruments will be added soon.

### Proposed Biotech Parks

Planning is on to develop two biotech parks (hubs) in Burdwan and in Kalyani. Work is also going on to set up biotech kiosk-cum-training centres in four districts, viz., Bankura, Paschim Medinipur, Burdwan and South 24 Parganas. Depending on its success, other districts will also be covered in phases.