Introduction

Assam, due to its inherent strength of vast natural resources and bio-geographical advantages, is recognized as one of the most potential agricultural states of India. With an area of 78,438 Km^2, the state is situated between 24^0 and 28^0 18 N latitude and $89^0$4 and 96^0 East longitude. The state is surrounded by seven north eastern hilly states- popularly known as seven sisters and as Astalaksmi in recent references (including Sikkim), West Bengal and two countries Bangladesh and Bhutan. The mighty Brahmaputra river and Barak river are the life-line of the people of both the valleys. The soils are mostly alluvial in the riverine tracts and red soils in the foot-hills areas. The climate is sub-tropical while the monsoon pattern is well defined with occasional deviations. Based on variation in rainfall, physiographic and soil characteristics- the state has six agro-climatic zones-accommodating about 26 lakh farm families. Thus agriculture and allied activities taken together are of overriding importance for the people of Assam as it is the way of life. In fact, by and large, it is the production system approach comprising crops, animals, fishes and other land-based activities. Consequently, the state's economy is agrarian contributing about 30 per cent to the state's net domestic product besides giving livelihood support to about 75 per cent of the population. In spite of a strong agro-based character, Assam had suffered from negative growth rate (- 0.23 per cent) at the end of tenth five year plan but vigorous drive subsequently to boost up this sector has led to a growth rate of + 4 per cent as per latest assessment. In spite of that, the fact remains that the state is a consumer state. The silver lining is that the state has become a surplus producer in case of rice-besides bagging national awards of best performing state in growth of some other sectors. But this level of achievement in comparison to potentiality of each individual sectors of agriculture is not encouraging. The scenario of gap between demand and supply of all agro products being far from satisfactory, the basic question arising is that whether the status of sluggish growth in these sectors are the consequence of deficiency in our policies- which could not address all the issues confronting our farmers properly. Augmenting farmer's income is a national issue and Assam is no exception. This is a crucial task as hike in productivity may not always lead to more income at farmers' level. We are to minimize cost of production through input use efficiency which is a technology-driven issue. The situation demands a paradigm shift in outlook in our approach i.e. more income rather than more production per unit area. This has further necessitated a market –oriented approach and that too with minimum injury to the soil and environment. Some other states have suffered from 'exploitive agriculture' as pointed out by – eminent scientist Dr. M.S. Swaminathan. Taking into consideration all these issues, a farmer centric policy has now become imperative. Farmers, the new generation

farmers are the architects of future agriculture – who are to be empowered to face competition with policies having the required vibrancy and dynamism. We are to gain from experiences of performing states and spectacular changes that are taking place in and around our country. This is a challenging task and the issues are becoming more and more challenging in the context of market competitiveness besides many other emerging issues-not familiar not only to the farmers but other stake –holders. The situation may even demand creative approach in handling new trends at farmer's level which may or may not be conducive for farmers in long run. With this background and taking into consideration of all these issues, it is proposed to frame up a comprehensive Agriculture Policy of Assam.

The need of the policy:

We need a road-map for all-round development of agriculture based on certain policies which can address wide range of issues associated with this vast sector. The foremost aim of the policy is to strengthen farm economy and more precisely the economy of the farmers who are the architects of future agriculture. Touching the daily life of about 315 lakh people and 27.20 lakh farm families, agriculture is the life thread of the State. The contribution of agriculture to GDP needs to be improved and the Government of Assam is committed to not only food security at the aggregate level but also nutritional security at the individual level. The sector being highly dependent on nature, it is subject to many biotic and abiotic stresses. In spite of that, farmers' aspirations to go for higher production, more income is the initial capital for any development in agriculture. But the irony of the fact is that farmers feel agriculture sector is neglected. Thus putting agriculture sector on a better path and resurrecting its importance across the sectors will go a long way in respects of agriculture. This is one of the foremost task set forth by this policy i.e. confidence building amongst farmers.

It is necessary that Assam records its rightful potential position in agriculture sector in any interstate comparison. Above all, it is the earnest desire of the farmers of the State that they require policy changes which was framed in the year 2010. Since then, there is sea change in farming sector which is impregnated with modern technologies. Besides, with the changes in market behavior there is consequent change in priorities. In the meantime multi-sectoral schemes initiated by the Government were pouring in to strengthen the target group i.e. farming community. The impact of those efforts, could bring only partial improvement in the scenario which remained insignificant when the potentiality is considered. So, there is necessity to revisit the policy to accelerate growth in each sector of agriculture to pave the way for at least doubling production and income in precise time frame. Another aspect is that employment generation in farming sector is the key to provide

incremental income across different regions and classes of farmers. The policy will encompass all issues associated with retaining youths in agriculture. Thus, keeping in view the twin importance of income and employment generation as primary objective of the policy, series of issues associated with agricultural development in Assam, will be dealt with appropriate policies for marching ahead with vibrancy and dynamism. Last but not the least issue is an emerging development. Act East Policy is targeted towards North East and Assam in particular. The first expectation is to create an organic hub aiming emerging markets of South East Asia-besides the national market demand. Being located strategically as gateway towards this part of the globe, Assam must initiate long-term planning capitalizing national expectations one hand and vast natural resources and bio-diversity bank that it posses on the other hand to emerge as an agricultural giant. This dimension, if properly planned and handled Assam including NE region may not have to look back any more in the days to come. Thus the new agriculture policy will have to have initiate focus on such road map and it is being structured accordingly.

A look at the expectations from the policy by various stake holders:

Stake holders	**Major expectations**
A. Farmers	1. Adoptable technology/orientation on latest technologies 2. Inputs- easy and timely availability, input use efficiency mainly seeds, water for irrigation, chemicals, fertilizers ,machineries and implements 3. Protection from climatic adversities like flood, draught, erosion, siltation & other biotic and abiotic stresses. 4. Credit support/financial backup 5. Insurance support/insurance literacy 6. Protection of their indigenous assets-crops, animals, fishes 7. Exposure on technology showcasing 8. Safeguard against middleman exploitation 9. Organizational initiative like FPO 10. End of man elephant conflict 11. Market support 12. Infrastructural support 13. Extension support/service support 14. Productivity and income enhancement 15. Safeguard against exploitive agriculture 16. Organic module and market

17. Dignity and status of their profession

B. New generation farmers
1. Want to see agriculture as a business module
2. IT coverage in agriculture
3. Massive mechanization
4. Skill based outlook in potential areas
5. Exposure on frontier technologies
6. Market oriented crop planning/entrepreneurship development

C. Agripreneur & hortipreneur
1. Volume and quality of raw materials
2. Product specific varieties
3. Consistency in supply
4. Market access
5. Infrastructure like cool chain/multicomponent cold storage
6. Govt. initiative for export and external market
7. Technology backup on frontier technologies like bioproducts, biopackeging

D. Consumers
1. Fresh and safe product at reasonable price
2. Pesticide/chemical free products
3. Off season availability
4. New and innovative products

E. Extension machinery
1. Strengthening of Directorate of Agriculture and Directorate Horticulture with required infrastructure and manpower
2. Reorganization of extension network in Training &Visit (T&V) module
3. Creation of posts in T&V module
4. Advance training on frontier technologies/market behavior/market oriented crop planning, IT application in agriculture etc.
5. Distance extension machinery from all input issues to make the department technology oriented rather than input oriented.
6. Parallel support to farmers with technology and required inputs simultaneously
7. Higher studies/human resource development
8. Non engagement in non agricultural activities
9. Ned based research support- including market oriented research

	10. Regular exposure on latest and frontier technologies 11. Support of KVK in structuring district wise roadmap & its periodical fine tuning 12. Orientation of VLEWs in a massive way
F. Research organizations (AAU)	1. Strengthening of research network with adequate manpower 2. Filling up of infrastructural gap on top most priority 3. Financial backup to strengthen research, education, skill &technology showcasing 4. Regular interaction with extension machinery of all allied sectors and other stake holders 5. Sharing schematic provision with DOA
G. ASAMB	1. Regular fund for market intervention to overcome drastic price fall 2. Strengthening market infrastructure and network of marketing units including panchayat level markets 3. State of the Art Directorate of Marketing 4. Induction of professionalism in the entire marketing scenario in business module
H. Government	1. Massive employment generation of unemployed technical manpower besides opening avenues for rural youths & farm woman 2. Confidence building amongst farmers 3. Coordination amongst all stake holders including national organizations 4. Take advantage of Act East Policy in agriculture sector 5. Encouragement of organic farming system 6. Explore investment opportunity in agriculture sector 7. Doubling farmers' income 8. Retaining youths in agriculture 9. Input use efficiency 10. Conservation of biodiversity 11. Sustainable utilization of bio-resources 12. Raise cropping intensity 13. Explore all frontier technologies in agriculture 14. Make Assam self sufficient in pulses, oil seeds, horticultural produces, potato, farm animals and animal products

15. Digital agriculture-Digital Assam-paperless administration
16. Make Assam a premier state in agriculture

The policy outlook:

The proposed agricultural growth and prosperity could be made by improving the livelihood pattern and means of production. In Assam, majority of families derive their livelihood support from agriculture in a most unsustainable way which is a multifaceted concept and refers to maintenance or enhancement of access of rural families to food and income generating land based activities. It encompasses secured ownership of, or access to resources, assets and income generating activities to offset risks, easy shocks of biotic, abiotic, environmental, market stress etc. and meet contingencies. Average farm size being small and poverty and food security being continue to be preponderant amongst small growers, the issue has to be viewed in the context of need for enhancement of productivity and profitability of agriculture and above all, as emphasized by the Government, improvement in the economic status of the farmers. Thus the situation demands careful and intentional policy interventions by the Govt. So, necessary provisions including legal provisions would be created for implementation of the new agricultural policy –whenever the situation demands.

Assam Agriculture at a Glance:

1. Area-78,438 Km^2
2. Administrative Units-Nos. of districts: 33 nos. (2017)

   Nos. of Community Development Block: 219 nos. (March-17)

   Nos. of Gaon Panchayat: 2202 nos. (March-)

   Nos. of villages: 26395 nos. (Census 2011)

   Nos. of towns: 88 nos. (Census 2011)
3. Total population-3,12,05 576 nos.
4. Density of population-398 per Sqkm.
5. Famers' profile (2010-11)

Category of farmers	Nos. of operational holdings (000 nos.)	Size of operational holdings (000 ha)
Marginal (Below 1 ha)	1831	775
Small (1.0 to 2.0 ha)	497	687

Semi medium (2.0 to 4.0 ha)	303	818
Medium (4 ha to 10 ha)	85	437
Large (Above 10 ha)	4	282
All size	2720	2999

6. Average size of operational holdings:1.10 ha
7. A significant projection of agricultural census of 2000-01, 2005-06 and 2010-11 is that there is distinct trend of decline in area of cultivation to the tune of31.11, 30.48 and 29.9 ha respectively.

   This decrease of operated area was caused due to soil erosion, increasing urbanization, industrialization expansion of road ways and other infrastructural development activities. Conversion of agricultural land to homestead land to accommodate ever increasing population. (Economic Survey)

   Secondly, the census reveals that about 67.3 percent operational holdings are marginal (Less than 1 ha) and 18.2 percent operational holdings are small (1 to 2 ha).
8. No. of farm families-27.20 lakh
9. Cropping status-
   a. Net area sown-28 lakh ha
   b. Gross cropped area-40.76 lakh ha
   c. Mono cropped area-14.53 lakh ha
   d. Area cultivated more than once-12.67 lakh ha
   e. Area under sifting cultivation -8.5 lakh ha
   f. Cropping intensity:149% (National average 141 %)
   g. Cultivable waste land-1.41 lakh ha
   h. Fallow land other than current fallow-0.86 lakh ha
   i. Current fallow-0.88 lakh ha
   j. Total fallow land-1.75 lakh ha
   k. Water logged area-0.64 lakh ha
   l. Area affected due to siltation-0.38 lakh ha (approx)
   m. Nos. of cultivators-40,61,627
   n. Nos. of agricultural labours-18,45,346
   o. Percentage of agricultural working force-49.35 percent of total work force
   p. Agro-climatic zones-6
   q. Area under horticultural crops- 5.94 lakh ha.
   r. Percentage of area under horticultural crops to gross crop area about 15 percent
   s. Area under major crops: (ha)

1.	Rice area (Lakh ha)	Sali	-	18.89
		Ahu + Bao	-	1.91
		Summer	-	4.05
	Total-			**24.85**
2.	Pulses area (Lakh ha)		-	1.42
3.	Oil seeds area (Lakh ha)		-	3.11
4.	Maize area (Lakh ha)		-	0.28
5.	Sugarcane area (Lakh ha)			0.29
6.	Jute & Mesta area (Lakh ha)			0.72
7.	Tea	Nos. of big gardens	-	765
		Nos. of small gardens	-	64,597
8.	Rubber area (Lakh ha)			0.32
9.	Horticultural crops area (Lakh ha)	Fruits	-	1.59
		Vegetables	-	-4.02
		Spices	-	1.22

10.	Plant protection	:	a. Total consumption of pesticides per year-160 MT (2011-12 b. Consumption per ha-39.80 gms.
11.	Farm machinery	:	Availability of farm power per ha-1.02 HP (national 2.05 HP)
12.	Irrigation	:	percentage of net cropped area-21%
13.	Insurance	:	No. of farmers covered-32547 nos. (2011-12) Sum insured-73.91 crores (2011-12)
14.	Paddy procurement by FCI	:	34,073 MT (2011-12)
15.	Market	:	Nos. of Primary Market yard- 20 nos.

<table>
<tr><td></td><td></td><td></td><td>Nos. of Sub-market yards-206 nos.
Nos. of Rural Primary Market-735 nos.
Nos. of wholesale market-405 nos.
Total markets-1140 nos.</td></tr>
<tr><td>16.</td><td>Storage</td><td>:</td><td>No. of godowns-52 (+Seed storage godown-21 nos.)</td></tr>
<tr><td>17.</td><td>Cold storage</td><td>:</td><td>26 nos. (total capacity-109540 MT)</td></tr>
<tr><td>18.</td><td>Processing units</td><td>:</td><td>6 nos.</td></tr>
<tr><td>19.</td><td>Credit</td><td>:</td><td>No. of KCC issued-a. No.-17.06 lakh upto March2016
b. Amount-Rs.3901.29 crore during 2015-16</td></tr>
<tr><td>20.</td><td>Status of livestock & poultry</td><td>:</td><td>(2011-12)
a. No. of cross breed cattle-(000 nos.) 470
b. No. of indigenous cattle--(000 nos.) 8469
c. No. of buffalo--(000 nos.) 544
d. No. of goat- -(000 nos.) 2796
e. No. of fowls--(000 nos.) 8579
f. No. of ducks--(000 nos.) 3228
g. Production of milk per year -(million litres)-838
h. Production of egg-(Million no.) 471
i. Production of meat (000 MT)-34
Availability & Requirement status (2011-12)
<table>
<tr><th>Component</th><th>Requirement</th><th>Availability</th></tr>
<tr><td>Milk (million litres)</td><td>2308</td><td>833</td></tr>
<tr><td>Egg (Million nos.)</td><td>5474</td><td>470</td></tr>
<tr><td>Meat (000 tons)</td><td>334</td><td>34</td></tr>
</table></td></tr>
<tr><td>21.</td><td>Status of fishery</td><td>:</td><td>(2011-12)
a. No. of beel fisheries (Registered & unregistered)-1197 nos.
b. Area under beel fisheries- 100825 ha
c. No. of Ponds & tanks -2,94,381
d. Area under ponds & tanks-41,949 ha
e. Total area under fisheries-3,93,734 ha
f. Annual production of fisheries (000 MT)-244</td></tr>
</table>

Policies on soil

The status and the issues:

Natural soil is often referred to as living because of the microbial mass that it carries which are indispensable for growth, health and sustainability of crops. Though Assam is by and large, an organic based production system follower, the State is inching towards exploitive agriculture-particularly in commercial growing pockets and tea gardens. The silver lining is that ill effects of exploitive farming in now realized in general and soil health becomes an issue of priority and Govt. is nurturing organic concepts in commercial line. Chemical based farming is reported to be one of the major contributors of health hazard at consumer level-contaminating soil, water, micro climate and climate effecting humans, farm animals, fishes and their derived products. Thus replenishment of soil adequately and improving and maintenance of production potential of soil being vital to the State, time has come to adopt specific policies, mostly technology driven and frame up a farming system that protects the soil and its health.

1. To ensure need based fertilizer application, issue of soil health cards to farmers and its periodical updating will have prime consideration to do away with prevailing blanket application of fertilizers. The whole exercise will be computer based and easily accessible to the farmers through web or net.
2. All roads leading to organic farming system will be focused at ground level and it will be an integral part of any production drive under national and state schemes.
3. The expertise of AAU, regional KVKs, NBSS & LUP will be mobilized to draw a road map visible to the farmers of each block covering problematic soils, degraded soils, soils of char areas, swampy lands, rain shadow belts, silted areas, riverine tracts, foot hills, Jhoom cultivation areas, hill agriculture and industrial belts affected by their effluents as in case of paper mills, cement factories and soils around STWs facing iron toxicities.
4. Soil loss under influence of heavy rain and flood is an issue. Such losses shall be prevented by way of contour laying and vegetative coverage promoting the cropping intensity, cropping density and forage farming.
5. Similarly erosion of riverine soil which is another major issue shall be checked both through erosion checking crops like broom grass, Vetiver and resorting to engineering technologies developed for controlling soil erosion. Convergence with soil conservation department on such issues will be explored.
6. In heavily silted soils, barren soils, the use of ‘soil conditioner’ crops like Guatemala will be explored for restoration of soil health.

Policies on land

1. Land**:** Issues to be encompassed:

1. Shrinkage of net cultivated area
2. Proper utilization of cultivable waste/char areas
3. Absentee land ownership
4. Fallow land at farmers' level, institutions, tea gardens etc.
5. Computerization of land documents
6. Unproductive VGRs
7. Forest villages
8. Land documents for institutional credit in agriculture
9. Related issues

A significant projection of agriculture census of 2000-01, 2005-06 and 2010-11 is that there is distinct trend of decline in area of cultivation to the tune of 31.11, 30.48 and 29.90 lakh Ha respectively. The decreasing of operational area was caused due to erosion, increasing urbanization, industrialization, expansion of road ways and other infrastructural development activities, conversion of agricultural land to home stead etc.

Policy: (i) Adequate measures will be taken to survey erosion prone areas through satellite imaging or other scientific module and adopt prophylactic protection measures to save areas prone to erosion and restore cultivated areas.

(ii) Secondly for the purpose of addressing erosion, the agriculture department in association with National Bamboo Mission, Ministry of Environment and Forest, Govt. of India shall take steps for massive plantation of anti-erosion crops like Broom Grass, Bamboo,Banana, Vetiver and other medicinal and aromatic crops along the erosion prone areas. This measure shall be explored as a supplementary measure to the plans and programmes of the E&D, Soil Conservation etc. departments. Agriculture officers of the site areas shall initiate this programme.

(iii) The transaction of farm lands are to be made more transparent for protecting interest of the farmers.

(iv) Since it is observed that huge amount of farm lands were being purchased by trusts and organizations etc. there must be a ceiling for all these types of activities. Even necessary legal provisions are to be incorporated in the existing laws so that excess land taken by them can be realized by the Government and put for farming activities.

(v) Cultivable waste and other arobic land should be brought under plough without disturbing the ecosystem

(vi) In order to minimize/restrict transfer of agricultural land to non- agricultural purpose, it will mandatory to State Land Use Board to review critically, on quarterly basis, the land allocation to sectors like real estate, industry, road and other infrastructure etc so that farmlands are protected properly.

(vii) Government will initiate special drive to acquire or utilize fallow lands under tea gardens with appropriate crops and entitlement.

(viii) Absentee land ownership being the greatest hurdle in raising cropping intensity in the state, it is proposed to explore following options-

1. Motivate land owners to go for second cropping by himself or in association with or in collaboration with others- as he may consider to be useful and if needed under legal protection.
2. Exposure of the land owners on frontier technologies preferably on paddy cultivation and also on other remunerative crops to encourage him to utilize the fallow land at their disposal.
3. The concept of contract farming under win win situation will be projected aiming to bring a change in the situation by the extension machinery –even through schematic support. The logic behind this concept is 'Rent a land for farming' .
4. Induction of integrated farming system module will also be explored in those fallow areas under absentee land ownership.

(ix) It will be explored whether in case of disposal of farm land the decision should also carry the consent of the wife of the farmer legally instead of unilateral decision on the matter. The aim is to protect the farm woman so that she can assert her right if her husband takes an unjustified decision for disposal of his farm land.

(x) Agricultural land data shall be digitalized using GPS and RS technology and such data shall be put under public domain.

(xi) The National Bureau of Soil Survey and Land Use Planning (NBSS & LUP) in consultation with local KVKs and Char Development Authorities of the Govt. of Assam will prepare sitemaps of char areas exploring best utilization pattern with crop or animal etc. with suitable measures.

(xii) Farmers of forest villages will be encouraged to go for live fencing [to minimize man animal conflict] with thorny citrus crops and take up early growing medicinal and aromatic crops which are not preferred by wild animals. Apiary will be encouraged in such areas. This step will ensure dual purpose of restoring forest areas and best utilization of unclassified lands-besides augmenting farmers' income.

(xiii) All the unutilized land under agriculture, horticulture, animal husbandry and fishery department shall be mapped by each department and then develop suitable plans for their utilization. This should add to quite a few hundred ha to the cropped area. Each department shall prepare activity milestones for this.

(xiv) The animal husbandry and veterinary department shall mandatorily utilize the VGR lands for the purpose of feed and fodder production to bring in animal feed security. The Department shall explore financial aids from DAH & F, Govt. of India and other sources. The state Govt. shall explore the possibility of man power backstopping to the department.

(xv) As land document is a vital instrument for securing institutional loan, suitable measures will be taken by use of IT and complete computerization of farm records including succession details –at village level to pave the way for instant availability of required land documents.

(xvi) The Govt. will draw policy to encourage suitable utilization of fallow lands available in educational institutes for developing gardens with crops of nutritional, aesthetic, botanical and ecological value.

Policies on seeds

The prevailing situation at a glance: Seed is the most important determinant of agricultural production potential. Farmers of Assam specially paddy, pulses and oil seeds growers have the traditional practice of maintaining a part of their produce as seed for next season. But this practice of maintaining seeds of traditional varieties by traditional methods is becoming obsolete gradually in view of the fact that high yielding varieties has come into picture which needs periodical replacement with new seeds and secondly the seeds of hybrids cannot be maintained as it becomes useless in next year. So, accessibility to good seeds is becoming an issue for farmers and Govt. intervention is a necessity now. Consequently, Assam Seeds Corporation, Assam Agriculture University and Department of agriculture are on the job but the experience in this regard is far from satisfactory only due to the fact that the State has no précised seed policy so far. Timely availability of quality

seeds at farmers' level is not happening satisfactorily impacting badly on farmers' effort to go for higher production. So, precise policy will be adopted as hereunder –

1. Only quality seeds will be made available to farmers and it will be treated as a right of farmers as per provisions of PPV & FR Act of Govt. of India.
2. As good seed is the nucleus of development of agriculture, every effort will be made to ensure good governance, transparency and accountability in whole system of arrangement.
3. In order to enhance the availability of quality seeds, the system has to ensure that the non performers-in the chain of activities be eliminated or help their better performance through required inputs, infrastructure and massive awareness and training.
4. The role of the Department of Agriculture.
    a. Structure a seed plan for the year ahead on the basis of critical assessment of requirement of various seeds and varieties of specific crops ear marking requirement for direct sale, for schematic support, for seed replacement projecting precisely time frame of availability and the sources to be explored-keeping in view the quality and truthfulness without any dilution.
    b. Similar assessment will be carried out well ahead in case of requirement breeder seeds, nucleus seeds, certified seeds in close collaboration with Govt. of India, Assam Agriculture University authorities and other research institutes recommended by ICAR system.
    c. The department, in order to ensure that only standard quality seeds with proven germinability and ensured performance will reach farmers, the State Seeds Testing Laboratories will be strengthened with all required infrastructure and manpower. Only after a clearance certificate from such laboratories seed will be issued to farmers. It will be mandatory to go for random sampling and testing of seeds in précised time frame so that the seasonal compulsion of distribution of seeds is maintained.
    d. In case of sourcing seed from outside agencies being not available within the State, it will be mandatory for a in situ verification of those agencies as regards their ability, purity of seed, stock availability, thrust worthiness, list of their tie-up agencies, track record and research backup etc. This will be carried out by specialists to be deputed by the department/ICAR system. In case of hybrids, only those recommended by ICAR system specifically for the State will be accepted by the State authorities without any deviation/dilution.

e. While sourcing seeds from outside the state, it will be mandatory to furnish information on genetic purity of the seed by the concerned agency to ensure assured performance at farmers' level.
f. For requirement of breeder seeds, the department will place indent to Govt. of India well in advance after assessment of time factor required in the process.
g. Aiming involvement of farmers for self production of quality seeds, the seed village concept will be popularized with vigorous training and required support including buy-back arrangement.
h. Every effort will be made to protect indigenous germplasm of various crops by facilitating Assam Agriculture University in this regard and also by supporting farmers initiative in this regard on priority
i. The infrastructures developed so far for processing, storage of seeds, seed banks etc. will be properly and scientifically utilized to strengthen seeds sector of the State and develop a distribution network in collaboration with Assam Seeds Corporation or any organization who can be helpful to fulfill this mandate
j. The department will initiate all steps needed for organic seed production and its tie-up with schemes and finally farmers.
k. Any complaint from farmers on quality of seeds, untimely supply of seeds, germinability gap, gap in performance and production potentiality, will be attended within 24 hours and expertise of local KVKs or AAU scientists will be utilized to arrive at a conclusion and suggest corrective measures.
l. Except in case of seeds of some crops whose seed production being not feasible due to climatic factors, the department of Agriculture will explore all means to phase out dependence on outside sources for seeds. To go ahead in this direction, following options, besides others will be explored-
    i. The infrastructures needed in the departmental farms will be build up to fulfill all requirement to develop as a seed production farm and required technical guidance will be made available alongwith required manpower.
    ii. Optionally, those farms can be leased out to AAU to take up seed production programme from their own with required support to them
    iii. Optionally, those farms can be leased out with précised full proof terms and conditions to farmers organizations/farmers with proven track records and technical backup/unemployed agricultural graduates to venture into seed production/public sector enterprise and such other agencies-making it mandatory to utilize the farm exclusively for production of seeds and planting materials only. It has to be ensured that

the farm does not become a stocking centre by seeds from outside sources under no circumstances.

m. The Department of Agriculture in consultation with AAU, ASC and stake holders will prepare a roadmap with time bound action plan to make Assam self sufficient in seed sector keeping in view farmers' necessity- which is a fast changing scenario.

Role of Assam Agriculture University:

1. The AAU with their inherent strength and expertise will be watchful on quality of seeds that are being produced, maintained and distributed in the State and advice Govt. and all concerned whenever their intervention becomes imperative in the interest of farming community.
2. AAU will be producer and custodian of breeder seeds which can be grown in Assam and make it available whenever needed for production of foundation/certified seeds.
3. AAU will directly take up certified seed production programmes in their own farm or farmers' flied if the Govt. desires so with required financial and other backup and tie-up arrangement.
4. AAU, in collaboration with Department of Agriculture will initiate action for maintenance of a seed stock of recommended and suitable varieties of crops to need emergent situations like flood, draught and other climatic deviation or crop epidemics etc. to compensate crop loss at farmers' level.
5. Assam being the breeder's paradise for germplasm of many crops, AAU will be responsible for preserving and conserving local germplasm of various crops on top most priority. A germplasm bank will be set up and maintained with all required information and AAU will ensure that, as far possible, no such assets are left out in the evaluation process.
6. AAU will advice the Government for introducing bar coded tags for ensuring the quality, traceability, parentage and accountability of seeds and planting materials. Based on guidance of AAU necessary steps are to be taken to launch a new software for meeting this objective.
7. AAU will explore production of seeds in rain shadow belts for crops whose seed production is not possible due to rain as limiting factor. The aim is to covert weakness in to strength with possible intervention in this direction in such areas.
8. The AAU is also expected to be watchful on informal way of farmer to farmer exchange of varieties in border areas so that the seeds entering into the State

does not carry any pathogen or virus etc. The KVKs functioning in such areas may be mandated with such objective also.

The role of Assam Seeds Corporation:

1. In order to do away with the problems faced by the ASC, a Govt. of Assam undertaking, steps will be initiated for amendment of its laws to increase its efficiency in delivery of quality seeds in time
2. A revival plan of ASC will be prepared involving all stake holders so that it can deliver as per expectation of the State and extend its business even outside the State.
3. The required infrastructure and technical manpower will be made available aiming disburdening of department of agriculture from seed issue.
4. The farms and nurseries scattered over the State will be equipped adequately which will be a part of the revival plan.

Policies on fertilizer

The status and the issues-

The chemical fertilizer consumption in the State is about 53.50 Kg./ha against national average of 104.50 kg/ha. Consumption of fertilizer is high in vegetable growing pockets and tea gardens. Farmers prefer blanket dose of fertilizers without taking into account the soil and crop requirement and thus fertilizer use efficiency (FUE) is low. Application of fertilizer on the basis of soil testing report or soil health card has started now only. Nutrient mining for exploitive agriculture is not an issue in Assam but there are reports that sub-standard or spurious fertilizers are being made available to the farmers in some pockets of commercial crop growers. Non availability of some fertilizers particularly in case of phosphoric fertilizers at peak season of requirement also reported occasionally. Namrup Fertilizer Unit, IFFCO and IPL are the agencies of supplying fertilizers through their dealers.

In order to increase fertilizer use efficiency, to maintain soil health through balance fertilization and availability of quality fertilizers at farmers' level following policies will be adopted-

1. All initiatives will be taken to motivate farmers to go for fertilizer application based on two aspects that are on the basis of soil health card and secondly on the basis of nutrient requirement including micro nutrients of the specific crops they want to grow.

2. To attain fertilizer use efficiency, use of slow release fertilizers like neem coated urea will be encouraged.
3. Fertilizer inspectors will be adequately trained on fertilizer control order and they will be supported by Quality Control Laboratories for vigilance on fertilizer quality.
4. Fertigation technology will also be a focused area in all awareness programme
5. To instill the confidence of farmers on the quality of fertilizer they procure and help enforcement agencies in segregating the suspected stocks in the field for quick follow up action, the Quick Testing Kit developed by CFQCTI that is Central Fertilizer Quality Control Institute will be popularized at farmers' level.
6. Farmers will be encouraged to go for balance application of fertilizers and also to go for a system approach by incorporating bio-fertilizers and organic manures, spilt and top dressing method etc. for maximum fertilizer use efficiency for sustainable way
7. Use of information technology for crop diagnostics, symptom analysis and transfer of information will be given emphasis

Policies on plant protection chemicals

The status and the issues-

The pesticide consumption rate of Assam is 81.58 gm. a.i/ha. According to an earlier estimate the national average is 381 gm.a.i/ha. Against this 'positive' aspect the negative aspects are that –banned chemicals are still in use, recommended doses are overlooked and farmers of commercial growing pockets adopt very high doses over the prescribed limit, economic threshold level (etl) is not looked into, prophylactic measures are not adopted and there is gap in adoption of IPM technologies and bio products, pesticide residue in food products, fodders, water is emerging as a major issue. Keeping in view all these issues following policies will be adopted-

1. Take appropriate measures to stop entry of banned chemicals into the State.
2. Orientation of pesticide dealers will be initiated to make them aware on the properties of the products they sell to the farmers.
3. Sale of pesticides based on prescriptions issued by competent authorities of department of agriculture will be popularized amongst farmers.
4. Cheap, quick and non destructive method of detecting pesticide residues in food items will be explored.

5. Setting up of pesticide residue laboratories-particularly in commercial vegetable growing pockets will be considered aiming safety of humans and animals from pesticide related hazards
6. Crop health management through Farmers' Field Schools, local production of bio agents, strict pesticide regulations, adoption of integrated pest and disease management (IPDM) will be subjects of vigorous awareness programme at farmers' level –to phase out- dependence on chemical agents gradually.
7. Scope of framing necessary legal provisions to protect the farmers from indiscriminate use of pesticides and dreadful diseases will be explored.
8. In order to ensure strict vigilance on indiscriminate use of pesticides and weedicides at field level including tea garden areas to minimize threats to ecosystem soil and water contamination by such chemicals and to arrive at a holistic approach for crops and environment management simultaneously protecting our crops, soil and water, a crop health and vigilance council will be constituted deriving expertise of retired scientists, professors, officers of extension machineries. This advisory body will facilitate effective field level intervention and function as a sentinel of chemical driven production system of agriculture and allied sectors.

Policies on farm mechanization

The status and issues-

The present availability of farm power (as per estimate of 2004) in the State is 1.25 HP per ha against a national average of 2.25 HP per ha. In spite of constant effort in last two plan periods through various incentives on individual and community basis, there is sluggish growth in farm mechanization impacting adversely on production of land and crops in restricting the State to improve its cropping intensity. Financial limitation of farmers , lack of awareness on utility and usefulness of tools, implements and machines, high cost of machines like pumpset, power tiller, tractor, rotavator, transplanter, harvester, thresher etc., non-availability of accessories and fuel & power within easy reach of farmers, lack of network of agro-service centres with skill manpower, lack of custom hiring service facilities, lack of sincere initiative of private sector and lack of interest of new generation farmers in farming are the issues prevailing in the State in farm mechanization sector. The situation is fast changing in rural areas in last few years with growing awareness on commercial farming and also due to acquit shortage of farm labour the demand for mechanization is increasing. In the context of this background it is proposed to adopt following policies-

1. Rapid mechanization of agri-horticultural sector will be a priority area aiming two objectives-
    a. Increase productivity of land, crops and gear up cropping intensity
    b. Retaining youths in agriculture, specifically by providing modern farm mechanization system as farming base-away from age old farming practices
2. Considering the farm labour shortage issue and the urgent need to embrace mechanization in large scale the Govt. will consider establishing a state of the art Farm Implement Manufacturing, Training and Research Institute to serve as a nucleus of dissemination of frontier technologies in farm mechanization sector. This will be affiliated to agricultural engineering division of AAU. A model mechanized farm will be a part of it to attract new generation farmers.
3. Special emphasis will be given to set up series of Agro-Service Centres associating local youths in strategic locations of rural Assam.
4. Small machineries and implements like mechanical weeder, mini tillers, mini sprayers etc. will be popularized aiming farm women –particularly in the tribal belts and hilly areas with adequate training and motivation.
5. Private sector involvement for providing service of large machineries like Tractor, Rotavator, Power tiller, Transplanter, Harvester, Processor etc. on custom hiring basis will be explored and encouraged with liberal terms and conditions and prescribed rate to small, marginal needy farmers.
6. Parallel to the big custom hiring centre, small village level customary service will be encouraged- associating primarily the local manpower and providing incentives for such venture.
7. Adequate support through subsidy for procurement of Tractor etc.to eligible farmers/FPO/NGO will be provided as incentive for mechanization.
8. Scope of utilization of solar pumps for irrigation purpose etc. will be explored alongwith such other innovative machineries like dryer, sprayer, horticultural climbers and tools like de-husking apparatus which helps towards working efficiency at farmers' level.
9. Necessary steps will be initiated for standardization in respect of minimum performance standard (mps) to make available quality equipments to the farmers to reduce downtime and provide hassle free services.
10. Instead of outsourcing farm machinery and technology, the indigenously developed farm machineries will be preferred whose sales, after sales service and repairing are readily available to the farmers to reduce downtime.

11. Low cost equipment and machineries should be developed and popularized in the state to ensure working efficiency at grass root level.

Policies on credit

The status and the issues-

As per Economic Survey of Assam 2016-17, the number of scheduled commercial banks in Assam is 2177 as on March-2016. Average population covered per bank is 14.33 thousand as compared to national level of 9.1 thousand per bank. As per latest estimate 48% bank offices are located in rural areas. An amount of Rs.3901.29 crores was disbursed as agricultural credit during 2015-16. The KCC issued was 17.06 lakh upto March-2016 since introduction of these schemes-which covers 62.76% of farm families-the total farm family of the State being 27.20 lakh as per census of 2011. It is reported that the number of operational KCC is much below the stated figure. A crucial look into the whole credit system will reveal that still there exists private money lenders, credit delivery institutions are not much farmer friendly, disparity in repayment schedule within the various components of agriculture, issuance of farm loan are not adequately linked to insurance, there exists serious problems of land documents needed in the process and so on. In order to overcome all these types of issues, it is proposed to take up following policies-

1. Credit at right time and in adequate amount being a basic requirement for resource poor farm families, the credit providing institutions will be pressurized to increase flow of credit particularly to small and marginal farmers.
2. All possible measures will be explored to strengthen cooperative credit system in the line of GPSS modalities –once functioning as a strong credit base.
3. The State will take up with NABARD to computerize the loan disbursement system to make it a hassle free system for the farmers with transparency and accountability.
4. Instead of land documents from the revenue authorities –which is a cumbersome process, the local ADOs may be authorized to issue possession certificate with prescribed laid down rules to be framed.
5. For medium and large farmers the admissible loan amount of Rs.10.00 lakh each shall be made accessible doing away with the hassles in loan processing by the banks.
6. Each identified farm families in the State shall be given Kishan Credit Card within a period of five years. After screening and correcting the applications for KCC submitted by the farmers, the bank concerned shall issue the credit cards within a day. The State Govt. shall also device modalities to screen out non farmers from availing the benefits.

7. The interest rates on the agricultural loans taken shall be brought down to 3 percent from the present level of 7 percent.
8. The loans taken for poultry, dairy, animal husbandry and such other allied activities/ ventures will also be treated as agricultural loans. The State Govt. will take necessary steps to put pressure on central Govt. to consider these types of loans also apart with crop loans as these activities are of the primary production type and inseparable from agriculture.
9. Since the repayment of all loans taken by the farmers are for farming only, they are to be treated as agricultural loans regarding the interest component. Their repayment schedule for recovery will be made ten years with a moratorium of payment for first year and payment of interest for the next two year considering the fact that profit margins from such allied agricultural enterprise are low in initial two three year and farmers find it difficult to repay the loan installment during this period. For horticultural crops, the tree crops, takes six to seven year for first fruiting and economic bearing and so the moratorium period for interest may be fixed accordingly.
10. The Govt. will regulate the functioning of the micro finance institutions (MFIs) if needed with legislation, allowing such institutions to charge only three percent interest rates above the rate they access it from the banks.
11. An 'Agricultural Credit Relief Fund' will be created with contributions from the central and state Govt. and banks for addressing the issue of waiving loans in the event of natural calamities
12. A system will be put in place for registration of the private money lenders and provision of legal support through legislative measures. Arrangement will be made for enacting legislation for debt determination and settlement of outstanding debts.
13. Issuance of farm loans will be linked to crop insurance for ensuring recovery besides as a protective measure for the farmer who takes loan.
14. Group approach to lending has been found to be cost effective where the rate of recovery is also high and the lenders risk is low. So promotion of groups like SHG, NGO, FPO etc will be given preference.
15. The commercial banks while dealing with agriculture credit, should recruit agricultural graduate for rural branches in particular.
16. Regional Rural Banks should be given greater autonomy and flexibility in planning and lending policies- as their tract record is promising
17. The state Govt. will provide interest relief to farmers who avail loans against Negotiable Warehouse Receipt (NWRs) issued against storage of agricultural produce in WDRA

registered warehouse to encourage farmers to store their produce to escape distress sale.

18. The financial institutions at the time of disbursement of loan should invariably inform the local ADO for giving the farmer good guidance for adoption of modern technologies and also for monitoring –which will facilitate repayment of the loan.

Policies on crop insurance

The status and the issues-

Agricultural insurance as a risk mitigation tool for the farmers is increasingly gaining recognition and thus Agricultural Insurance Company of India Ltd. (AIC) came into picture in 2002. The aim was to cast a protective net over agricultural and allied activities from natural perils and risks. In Assam, AIC is trying for increasing insurance literacy and creating awareness on it. As on date the major challenge before AIC is to overcome the issue- 'lack of crop insurance awareness' amongst the farmers. In fact, NAIS could not ,make much headway in the State and reasons are lack of awareness, low subsidy premium (10 per cent) for small and marginal farmers, delayed claim settlement, slow response of banks in issuance of KCC etc. Moreover, some crops important for Assam are left out under insurance coverage. Subsequently, National Agricultural Insurance Scheme was restructured as Modified National Agricultural Insurance Scheme (MNAIS), to make it more farmer friendly. The scheme became compulsory for loanee farmers and voluntary for non loanee farmers –with uniform seasonality norms – for both types of loanees. Sum assured can be opted upto 150 percent of the value of average yield. The scheme provides account payment upto 25 per cent of likely claim as immediate relief to the farmers. For calculation of threshold yields, average yield of last seven years-excluding upto two years of declared natural calamity is considered. This scheme is implemented in Kamrup and Dhubri district from 2010-11. In order to make the scheme more attractive –weather based crop insurance scheme (WBCIS) was introduced in Assam from 2013-14. The status of MNAIS and WBCIS in last few years can be seen in the table below-

Scheme	Season & Year	Area covered (Ha.)	Sun assured (Rs.in crores)	Premium received (Rs. in crores)	Total claim (Rs. in crores)	Farmers covered (Nos.)	Farmers benefitted (Nos.)
MNAIS	Rabi 2010 to Rabi 2014	15,767	65.296	2.414	0.986	20,063	1614
WBCIS	Rabi 2013 to	39,521.39	239.38	24.100	12.254	66,003	20,242

	Rabi 2016						

The table reveals that the performance of this vital scheme to protect farmers is far from satisfactory. Keeping the status in view it is proposed boost the sector with following policies-

1. The gap in insurance literacy amongst the farmers is to be minimized through massive awareness measures.
2. The system of claiming insurance should be farmer friendly and a time bound response from the concerned authorities is to be ensured.
3. The system covering few crops in few areas is to be avoided and a blanket approach is to be ensured.
4. An expert committee to be constituted to examine the required changes in the existing rules and provisions of insurance schemes and take action accordingly.
5. Besides natural calamities, it has be explored whether victims of man elephant conflict can be covered under the provisions of insurance as large scale damage of crops is occurring and that too being alarmingly in increasing trend in various parts of the State.
6. It has also to be examined whether abrupt price fall in the market of particular commodity deserves insurance support to the poor farmers as it becomes a damaging situation not less than a situation created by natural calamity.
7. There exists enough scope for utilization of satellite imagery and other technologies in crop insurance. It can assist in decision making by insurance authorities by drawing inputs in various ways and such innovative scopes will be explored.
8. Not only crops-but all farm initiatives need risk containment steps and it will be endeavor of the govt. that insurance must come into picture as a main component.
9. The State proposes to cover 5.5 lakh famers under recently introduces Pradhan Mantri Crop Insurance Scheme that is 'Pradhan Mantri Fasal Bima Yojna'. All efforts will be made to make the scheme a good success.

Policies on agricultural market and marketing

The status and issues-

In Assam, the regulation and development activities of markets began with the enactment of the Assam Agricultural Market Produce Act-1972 which was effectively implemented from 1977. All activities are under Assam State Agricultural Marketing Board

(ASAMB) through market committees scattered over the State. There are four categories of markets in Assam. Highest number (3424.) of markets in the category of weekly markets followed by daily (481), biweekly (286)-all of the traditional type, and regulated markets (24). The market infrastructure of livestock products is poor. As per Economic Survey of Assam 2016-17, at present there are 24 regulated market committees, 20 primary market yards, 143 traders shop, 532 action platforms/ retailers shade, 806 rural primary markets, 405 wholesale markets, 1 organic market, 18 packaging rooms, 42 drying platforms and 15 processing industries in the State. The regulated markets have been covered under AGMARKNET. To assist farmers for carrying vegetables to distant markets the ASAMB provided transport subsidy to 980 farmers. Besides they provided 1102 nos. of three/four wheelers to producers during 2012-13. During 2013-14, the department of agriculture proposed to provide 2372 nos. of three/four wheelers/auto vans, 35nos. of refrigerated vans and developed 15 nos. of rural huts. They also proposed to provide 610 mini trucks to carry produce from interiors to markets. Some major steps taken up to boost up marketing support and for post harvest management are –farmers are mobilized to form 25 nos. of Farmers' Producer Organizations (FPOs) for securing better price for their produce, rural farm women have been empowered by training and providing mini processing units for pulses and oilseeds-so that they can earn from them; exploring international market (USA) for indigenous Red Bao paddy etc. In spite of all these efforts a market driven atmosphere in agricultural sector has not yet been created in Assam which is the need of the hour and market support to farmers is inadequate due to strong presence of middleman with exploitive attitude. Based on these issues, the new policy initiative are proposed as hereunder-

1. Exploitive attitude of middleman being the greatest hindrance in securing remunerative price by the farmers, all policies needed to minimize the role of middleman will be adopted- which may in the form of market intelligence, infrastructure and Govt. intervention.
2. As the role of panchayats in strengthening rural markets and streamlining local products to markets, is extremely limited the Govt. will explore proper revenue sharing with Govt. institutions like ASAMB and build up regulated markets at least one or two in each district.
3. ASAMB will be associated to build up at least one big whole sale market on hub and scope model in each district

4. To streamline flow of agricultural produce from grass root level, collection centres/ wayside collection centres will be set up under tie up with procurement agencies. FPOs will be associated whenever or wherever possible in this regard.
5. At least three terminal markets will be set up with all modern facilities in three strategic locations of the State.
6. Minimum support price will be announced during the commencement of the season by the state Govt. with the help price fixing authority as notified by the Govt. ASAMB will instrumental to shoulder the responsibility of procurement'
7. A Directorate of Agriculture Marketing look after the entire gamut of issues of marketing with futuristic outlook will be set up on most modern footing.
8. An Agricultural Marketing Institute for training on capacity building on market competitiveness of all stake holders including farmers to encourage them for market oriented crop planning and required skill on all pre and post harvest aspects, will be set up in the line of National Institute of Agricultural Marketing, Jaipur or MANAGE in Andhra Pradesh.
9. The State will be strengthened with all required marketing infrastructures like post harvest handling, assembling, sorting, grading, processing, storage, packaging-bio-packaging, transportation, quality certification, palletization, labeling, pre-cooling, cold storage, ripening chamber, display and export promotion platform, IT accessories and intelligence, retail outlets including load and transport facilities.
10. Indigenous assets of Assam like Joha Rice, Glutinous rice, par boiled rice, bao or red rice, local nutritious fruits , vegetables, spices, medicinal and aromatic crops etc. will be projected and tie up arrangement will be made with players like Patanjali, Dabur etc. for marketing under win win situation with local growers and entrepreneurs
11. The AAU will require to take up massive market oriented research on wide range of areas keeping in view even decades before us.
12. Good Agricultural Marketing Practice (Like good agricultural Practice) will be encouraged in any capacity building initiative.
13. Experience shows that government intervention in peak times of price fall gives a good back up to farmers facing distress sale. ASAMB will be equipped adequately in that aspect with infrastructure and revolving fund.
14. Since business as usual mode will not do to enter into the fast changing agricultural trade, the State will re-organize its agricultural marketing sector with infusion of marketing professionals.
15. A functional food quality assessment cell manned by efficient officers with knowledge in international food trade and quality parameters shall be put in place

16. The Govt. shall encourage agri-based tourism for widening the scope of the farmers, specially for the new generation farmers and agripreneurs in strategic locations of production base/plantations
17. The Assam Project on Agri-business and Rural Transformation (APART) initiated under World Bank assistance is being initiated. The market intelligence cell will be vital component of the project which will be set up at ASAMB. The competency of this cell in assessing not only the current price behavior but for also assessing price forecast in more realistic manner -will guide farmers the ideal time of disposal of their produce. The Govt. will sincerely monitor the situation from farmers' angle and suggest on mid course improvement if needed.

Policies on seeds and planting materials of horticultural crops

The status and the issues-

Except a minor part being made available by ASC, AAU and DOA & CDB (in case of Coconut) there is no govt. system to fulfill the requirement of quality planting materials of farmers of various districts. Non availability of assured, true to the type quality planting materials within easy reach of famers is one of the major causes of sluggish growth of horticulture sector. The role of private players in this regard is bigger but the products are always questionable, undependable, and unpredictable in performance and above all an amount of misleading information to the farmers is always there which affects productivity adversely. It is more so in case of long duration horticultural crops. The capacity of the private nurserymen is reflected in poor status of stocking and maintenance of mother plants in their scion block/In order to improve this situation following policies will be adopted-

1. In case of seeds part of horticultural crops, the policies which are applicable to policies under 'seeds' of agricultural crops will be adjusted.
2. In case of planting materials of horticultural crops –which includes seedlings, grafts or budded seedlings, layers, clones, rhizomes, suckers, tubers, bulbs, stolons and vegetatively propagated tissue culture plantlets etc., the foremost task will be the elite, true to type and recommended mother plants/stocks, to use as a nucleus at source of production.
3. The mother plants /stocks of varieties recommended by ICAR system will only be accommodated without any deviation.
4. Elite and performing mother plants available at farmer's level will also be acceptable provided they are recommended and tagged by the authorities of AAU.

5. While sourcing planting materials from outside organization clearance from ICAR system will be mandatory.
6. The planting materials including seeds produced and distributed by the department of agriculture, PSUs and other Govt. agencies shall bear bar-coded tags for ensuring quality and traceability (bar-coded tags are used for data retrieval for ensuring its parentage and accountability)
7. Till the market for disposal of planting materials becomes highly demanding and a system is developed for systematic and regular disposal of costly planting materials, the department will encourage setting up of series of elite nurseries in the districts instead of costly High-Tech Nurseries –whose maintenance becomes burdensome with the available manpower, infrastructure and financial backup in proper time. However, private sector initiative in this regard will be encouraged under strict vigilance on quality and total restriction on doing business based on planting materials brought from outside sources- with questionable qualities and likely pathological carriers or viral presence in them.
8. Crop-wise seed quality control system will be designed and established and seed coating and pelleting will be done to protect the seeds from various diseases, pests and viruses as well as to enhance germination.
9. In order to meet the regional demand of horticultural planting materials, the KVKs scattered over the State will be advised to develop a nursery block –as a source of planting materials at least to meet as mother plants by local farmers.
10. The policy of State Directorate of Horticulture and Food Processing will be to develop at least one elite nursery in each district for easy accessibility of local farmers. The departmental nurseries will also be strengthened suitably.
11. In order to pave the way for registration of nurseries steps will be initiated to formulate nursery act in the State.
12. Till the process of registration is on, the practice of accreditation by authorized agencies of private nurseries will be followed.
13. In order to ensure quality of planting materials being sold to farmers it will be made mandatory for the private nurseries-
    i. To develop scion bank with recommended varieties
    ii. To arrange for accreditation by concerned authorities
    iii. To source mother plants from ICAR system only
    iv. To maintain documents of their procurement from such sources
    v. To maintain technical standards/ norms in case of age of seedling and other quality aspects

14. The Govt. will encourage specialized nurseries from private nurseryman, groups of farmers who venture into production of specialized crops like orchids, medicinal and aromatic plants, local minor fruits, spices, unique uncommon local foliages and flowers, ferns and such type of crops and other ingredients suited for landscaping, institutional gardening etc.
15. The Govt. will explore the possibility of establishing partnership with other NE states to strengthen availability of elite planting materials.

Policies on water conservation, irrigation

The status and the issues:

About 10.5 per cent of total geographical area of Assam i.e. about 8251 sq. km. area is occupied by surface water bodies. The average annual rainfall is more than 3000 mm. Thus, the vast network of rivers, tributaries and rainfall are the prime source of water for the rain fed agriculture system. The monsoon is the real Agricultural Minister- as it is often said. The area under assured irrigation is 7.33 lakh ha. (26% of the net cropped area). There are spatial and temporal variations of water availability as 75 percent of rainfall occurs in 4 months with higher precipitation. Occasionally, farmers suffer from meteorological draught, hydrological draught, or agricultural draught while flood is a regular phenomenon in riverine fields. Based on this situation, the State proposes to adopt the following policies-

1. As water is the most critical input, water literacy at all levels will be popularized by all means
2. Command area development, preferably through surface water and secondly by exploring ground water will be priority area
3. Natural water resources management for irrigation will be prime area of intervention
4. Convergence of all stake holders amongst irrigation promoters viz. engineering section of Agriculture Department, Irrigation Department Soil Conservation and others will be ensured to derive maximum benefit at field level.
5. The problem of arsenic, lead, fluoride and iron contamination and toxicity will be looked into through technological intervention. AAU will initiate a status paper and action plan on this issue.
6. Restructuring/resetting the irrigation canals for preventing seepage loss of water with priority attention to tail end plots as they do not receive irrigation water at all.
7. A focus area will be use of electrical LLPs considering its cost efficiency

8. Comprehensive efforts will be made to explore all options available for water use efficiency at farmer and even at consumer level. As it is the ratio of output to input-expressed in percentage, the aim of two parallel flagship concepts I.e. more crop per drop and doubling farmers' income will be achieved largely with this strategy
9. Modern cost effective concepts of irrigation –like drip, sprinkler, fertigation, water holding granules, pipes instead of open canals, technologies to check evaporation loss- like soil mulching etc will be popularized.
10. Developing appropriate flood water management and conservation measures in the line of small, medium and big water -shed bringing in convergence with central and state sector schemes and thus promoting surface water lift irrigation upto around 20 per cent.
11. Supporting rain and roof water supporting devices including the treatment and channelization of marginal water to crop fields to facilitate life saving irrigation to less water demanding crops.
12. Instituting state level awards to the individuals and communities adopting novel and effective water harvesting and use models
13. Increasing the storage capacity of major and minor irrigation schemes and de-silting of dams and cannels on priority basis to improve the water availability for crops in the irrigation command area

14. As under utilization or non-utilization of command area created is a serious issue, appropriate measure for motivation of farmers benefitted by this valuable asset will be taken up and if necessary initiation of legal compulsion will be explored.

Policies on agronomic crops

A. Cereal crops-

1. **Rice:** Rice occupies about 25 lakh ha which around 64 percent of the gross cropped area of the State. It is grown in four distinct seasons namely Sali (Winter rice) Boro, (Summer rice) and Ahu (Autumn Rice) and also Bao (Deep water paddy) of which Sali is the predominant one which covers about 16 lakh ha. Present production is 52 lakh MT which can be taken to 120 lakh MT with a sound policy as hereunder-
    - Precisely to concentrate on relatively risk free 14 lakh ha area during Sali season, the target will be to attain a productivity level of 6 tons in 12 lakh ha with mega varieties and hybrids and 4 tons in 2 lakh ha with improved Joha, Bora rice varieties

- Increase area under summer paddy (Boro) from 4 lakh ha to 6 lakh ha with expansion of irrigation facility to obtain the yield of 7 tone par ha and thereby to produce 42 lakh MT of paddy
- Thus more than 120 (80 +42) lakh MT paddy production is targeted from this relatively risk free and stable rice area of 20 lakh ha.
- Research for development of rice varieties with yield potential of more than 10 tons per ha having multiple resistance against biotic and abiotic stresses and preferred grain quality will be initiated
- Introgress biotic and abiotic stress resistance genes into mega rice varieties
- Development of rice hybrids targeted to specific situation and uses e.i product oriented rice variety
- Explore the commercial prospect of deep water paddy (Bao) specially for export of red kernelled rice
- Popularization of situation specific stress tolerant rice varieties alongwith specific practices in the risk prone areas
- Popularization of organic cultivation of specialty rice verities (Joha, Bora, Chakoa, Red rice etc) in identified areas aiming national and international market
- Promotion of integrated rice fish culture.
- Restoring confidence of farmers in govt. procurement policy
- Popularization of proven technologies like SRI, INM, IPM etc.
- Special measures for provisioning modern rice mills in different pockets of the State.
- Emphasis on developing wide range of rice based value added products
- Rain fed areas under paddy will be adequately supported with precise strategies with technologies suited for such situation
- All efforts will be made to protect indigenous rice varieties having unique traits in them and they will be nurtured in about 10-20 percent of the rice area
- Soil health will be monitored particularly in intensive rice growing areas

2. **Maize**: The importance of maize is gaining popularity very fast as there is a clear indication of increasing area from less than 20000 ha to 24000 ha in last 3-4 years. The crop has overcome stagnancy of decades in case of area. Thus

considering farmers acceptance the policy will be to cover at least 2 lakh ha and attaining productivity target of 5tones per ha from existing 0.9 tons per ha. To produce at least 10 lakh tons of maize in next 4-5 years is proposed by adoption of the following policies-

- Promotion of maize in char areas with support in terms of quality seeds of improved varieties and essential tools and implements for cultivation and post harvest management particularly seed drill, maize Sheller and dryer
- Due emphasis on specialty maize like sweet corn, baby corn, QPM
- Expansion of irrigation for rapid increase in rabi maize area
- Research for development of maize varieties particularly early maturing varieties- both composite and hybrids specifically fitted to Assam situation with yield potential of more than 7 tons per ha with resistance to biotic and abiotic stresses and also agronomy and plant protection packages for realization of yield potential in the farmers field
- Development and promotion of package of practices for organic cultivation of maize
- Support for establishment of feed mills for poultry and livestock in different pockets and also it will be explored whether PPP mode can be extended in this area aiming industries associated with other value added products of maize
- A feasibility study may have to be undertaken for propagation of maize sector on industrial outlook

3. **Wheat:** In Assam wheat is not retained by farmers own screening process and thus it is confined to almost in an area of 21000 ha only (economic survey-2016-17). This is a risky crop in Assam as the harvesting season coincides with early monsoon rain and it is very difficult to escape this season. In spite of that it is localized crop in some specific pockets. However there is need to adopt following policies to promote wheat wherever there is scope-

   - Promotion of wheat in potential areas with support in terms of quality seeds of improved varieties and essential tools and implements for cultivation and post harvest management, particularly seed drill, thresher and dryer etc.
   - Expansion of irrigation for increasing area and productivity of wheat.

- Research for development of high yielding wheat varieties, particularly early maturing varieties with resistance to pre harvest sprouting and biotic and abiotic stresses and also agronomic and plant protection packages for realization of yield potential at farmers' field.
- Development and promotion of package of practices of organic cultivation of wheat

4. **Minor cereals- like buckwheat and foxtail millet**-These are minor cereals of Assam particularly in char areas, hilly and foot hill areas where they are grown traditionally more particularly in BTC, Karbi Anglong and Dima Hasao district. The package of practices has been developed by AAU for scientific cultivation of these crops. A feasibility study may have to be conducted whether these crops needs to be expanded considering the farmers acceptance and whether they can be fitted in crop diversification agenda in some specific belts with difficult growing condition as they have very high nutritive value. Bases on this report of study, needed action will be initiated.
5. **Pulses**: As per economic survey-2016-17 pulses covers an area of 1.42 lakh ha to produce 1.08 lakh MT of various pulses with a productivity of 757 Kg. per ha. Our current requirement is about 3 lakh MT and thus Assam is consumer state in case of pulses and the deficit is substantial. Agro-climatic situation being congenial for growing various pulses, there is urgent need to expand the area under pulses particularly green gram, lentil, black gram, field peas, lathyrus, rajmah and arahar. Our cropping intensity being only around 146 percent, it is evident that there is no dearth of area for expansion under pulses. Secondly, productivity can also be increased to 1000 kg. per ha. Considering the situation it is proposed to adopt specific policies to boos up the sector in the State-
    - Making quality seeds of suitable varieties available to the farmers with even provision of cold storage in the seed hubs considering vulnerability to damage in humid climate
    - Improving farmers' access to irrigation for rapid increase of area and productivity.
    - Expanding area under pulses, particularly, the rabi pulses like field pea, lentil, lathyrus and rajmah making use of sali rice fallow and other suitable areas.
    - Breeding/ introducing high yielding pulses with better adoption to acid soils, moisture stress and late sowing during rabi season

- Green gram, one of the shortest duration crop will be a focused area due to high market demand and feasibility of growing even under post flood situation and that too with almost zero tillage
- Developing and promoting situation specific agronomic practices with emphasis on drainage and moisture stress management and INM, IPM and cropping system.
- Provisioning processing facilities that is dall mills for the pulse growers

6. **Oil seeds:** Against the current requirement about 4 lakh MT, Assam produces 2.15 lakh MT of oil seeds. There is need to minimize this gap with mission mode approach. Potential area for expansion of area under oil seeds being not a limiting factor, we can aim at covering an area of 5 lakh ha to produce 5 lakh MT of oil seeds in next five years. It can be achieved by following policies as hereunder-
    - Timely availability of quality seeds of high yielding varieties
    - Enhancement of seed replacement rate of toria with access to irrigation
    - Rapid transfer of improved technologies including fertilizer and other input application (e.i Borax, sulpher, lime etc) and moisture conservation methods (including tillage management)
    - Integrated pest and disease management
    - Introduction of bee colonies in toria for effective pollination
    - Development and popularization of site specific, short duration, high yielding/hybrid varieties of minor oilseed crops like sesame, Niger, linseed, ground nut, sunflower etc.
    - Access to oil extraction facilities for the oil seed growers with installation/popularization of low cost high efficiency oil expellers in the oil seed growing pockets.
    - Identification/ development of early maturing (100-110 days) mustard varieties with high oil content (40-44%) and yield (2000 kg. per ha)
    - Expansion of area under oil palm plantation which is emerging as a major sector will be explored in uncultivable waste lands, rain shadow belts and barren areas
7. **Sugarcane:** The State has 0.30 lakh ha under sugarcane. In absence of sugar mill large part of sugarcane produced in the State is used for jaggary making and part is used either for chewing or for juice making. Entire sugarcane

produced in the state is locally marketed. In absence of sugar factory the demand for sugarcane may not increase very much and therefore efforts will be made for revival of the existing sugar mill at Dergaon in upper Assam and also for establishment of sugar mill in potential areas subsequently. Efforts will be made for saturation of more area under high yielding varieties.

8. **Jute**: The State has 0.7 lakh ha area under jute concentrated in six districts and the areas are predominated by migrants from Bangladesh. The indigenous farmers are reluctant to grow this crop as the crop is highly labour intensive and is not much remunerative as it used to be earlier. In absence of jute mill the demand for this crop may not increase vary much and therefore efforts will be made for establishment/revival of jute mill in the potential area. The govt. shall do everything to promote the modern techniques of processing (retting etc), diversification of its uses including bio-packaging etc. Govt. may have to monitor the procurement status by Jute Corporation of India in the interest of the farming community.

Policies on horticultural crops

In Assam, horticultural crops occupies around 15% of total cultivated area but it is a prime area for income generation, employment generation and when diversification becomes imperative for market oriented crop planning. Assam grows wide range of horticultural crops namely fruits, vegetables tuber crops, ornamental crops, medicinal and aromatic plants, spices, plantation crop like coconut, cashew rubber etc besides mushroom and honey production. The entire horticultural sector needs improvement in productivity, production and quality. There is strong tendency that horticultural sector is poised for coming out from rural confines to commercial plantation. This has to be so in view of our immense potentiality in one hand and emerging markets for horticultural produces for the other hand. So, this momentum has to be capitalized for future planning to boost up this sector. With this overall background, following policies will be adopted-

Focus on horticulture

This era being recognized as the era of specialization, horticulture, with its family of vital components like fruits, flowers with orchid kingdom, vegetables, spices, medicinal and aromatic crops, mushroom, apiary and value additive part of it, needs specialized and focused attention. The diverse natural resources of each component of this sector in Assam and NE, the vast scope for income and employment generation, the inherent creative and aesthetic fabric of this science-and above all the global recognition of horticulture as a

sunrise area, are the factors behind to make it a focus area in Assam. With foresightedness, it can be said that horticulture may be a springboard for entry into emerging markets of South East Asia. To achieve this, following policies will be adopted in the days to come.

1. An independent department of horticulture will be created with required infrastructure and manpower upto field level.
2. The Directorate of Horticulture and Food Processing will be manned with specialized manpower trained/experienced with vital components like fruits, vegetables, flower, MAP etc. including agri-business management and market experts.
3. The needed manpower upto grass root level particularly in most potential horticultural pockets will be deployed with required infrastructure- so that end to end approach is maintained in a sustainable manner.
4. To go ahead in this direction, a DPR will be prepared with the help of experienced personal/ organization- who are familiar with Assam situation upto grass root level and have a scientific post harvest and market analytical capability. On acceptance of the DPR after critical analysis, immediate steps will be taken to accommodate most modern Department of Horticulture in the state to bring vibrancy and dynamism amongst horticultural growers/entrepreneurs and all other horticultural stake holders including women farmers in the vast playground of horticulture.
5. A Master Plan for development of horticulture sector in Assam in a crop, location and technology specific way will be prepared- which will project roadmap for each district and deliverables after five years. Experts/ organizations with good track record in this area will be sourced and a committee comprising experts of department of horticulture and AAU will initiate action in this direction.
6. Adequate budget support will be provided to achieve this goal of implementing the master plan as proposed above at sl. 5 above.
7. While the college of agriculture at Biswanath Chariali will be entrusted to set up a germ plasm bank, scion bank, and a root stock reserve for indigenous horticultural crops accommodating minor fruits, flowers including orchids, MAP, besides maintaining a nursery, a parallel unit will be set up under Horticulture College being under construction at Nalbari-which may have a separate campus for it in a suitable location to support farmers of lower Assam.
8. It will be endeavor of the Govt. to strengthen production base of horticultural crops indispensable for processing and marketing agencies and external investment under private sector. To do so, it will be vigorously perused whether at least one elite nursery can be developed in each district for local farmers. FPOs or technical graduates will be incentivized to take up such activities besides Govt. own initiative.

9. In case of selection of crops only those having market demand, low parishability, low volume and high value crops will be prioritized.
10. The entire homestead gardens (Bari) system will be aimed to give systematic and scientific footing by practices like replacing senile trees with productive trees, canopy management and all scientific interventions.
11. There will be two way approach-to have volume of horticultural produce mainly through improvement in 'bari' system and secondly encouraging development of series of monocropped belts aiming market and value addition.
12. As separate temperature and relative humidity regime is needed to extend shelf life of fruits, vegetables, flowers etc, multicomponent cold storages will be encouraged.
13. Efficient post harvest handling starting from pre-harvest treatment, plucking season and methodologies, grading, washing, packaging, transportation, storage, display, marketing etc will be popularized through training, skill and exposure.
14. Some horticultural crops including vegetables are identified as 'future crops' which are not so much in focus now but already identified as promising players of future considering their unique nutritive and other values. A list for such crops in Assam will be prepared for commercial multiplication like garcinia, gorjamnut or foxnut (Nikori) etc.
15. The AAU will come out with a strategy paper on how to combat a situation where indigenous horticultural crops are being threatened to be wiped out by invasion of commercial crops like tea and rubber –posing threat to our ecosystem particularly soil health and valuable biodiversity.
16. Horticultural crops particularly vegetables having product specific qualities will be given priority for expansion to pave the way for processing sector.
17. For vegetable crops, major emphasis will be towards off season production to ensure better price to the growers and avoid market glut. The KVKs located near production belts of vegetables will develop precise package projecting low cost green house, precise suitable varieties and other related technologies for local farmers. Incentives on inputs will be provided to expand this concept of protected cultivation. Relay cropping may be a part of it to increase cropping intensity
18. Pesticide Residue Analysis Laboratory should be build up in strategic locations for constant monitoring considering consumers safety. If needed, penalty should be imposed on growers indulging in application of banned chemicals, chemicals above the prescribed limit or selling before the safety period is over. Organic substitute of chemicals to be popularized.

19. Setting up of combined vegetable garden and nutritional garden with valuable minor fruits in educational institutes will be initiated for needed orientation of student for this vital area of natural science.
20. The cropping intensity of 146 % of the State projects that fallow lands are in abundance in paddy fields, other cultivable waste lands, riverine tracts etc. So, expansion of area under vegetable crops is possible almost in all districts. In hilly districts summer vegetables can be taken up in large scale besides squashes, pumpkin, gourd, type creeper vegetables. As farmers' acceptance to go for second or third crop with vegetable depends on their limitations in case of irrigation, problem of stray cattle-both the issues will be addressed as outlined already in respective sections.
21. In spite of limitations, new generation farmers have started vegetable farming out of their own resources or under schematic support. This trend has to be capitalized aiming to retain those youth in agriculture. Documentation of such success stories and projection in motivational programme will sure to give mileage to double existing vegetable production of about 52 lakh MT.
22. The KVKs under AAU are expected to develop model vegetable cultivation with cutting edge technologies like soil less culture, hydroponics, fertigation, drip and sprinkler irrigation, novel mechanized system like use of rotavetor, zero tillage farming, dry land farming, use of soil conditioners for reclamation of heavily silted areas, organic recycling and so on.
23. To boost up agri-tourism or horti-tourism, a vital area may be the vast water bodies in the form of beels, swampy areas, where floating vegetable gardens may be experimented with farmers' participation as a beginning as it is million dollar enterprise in south east Asian countries like Indonesia and even in European countries.
24. Potato will be a priority area to make the state shelf sufficient on this crop. The module followed by the neighboring state of West Bengal can be replicated by setting up series of small size cold storages and associating FPOs and other potato growing farmers' Clusters of the State. A feasibility study may be conducted on it on top most priority.
25. Tuber crops like Yam, Casava or Tapioca, Ipomoea etc. have industrial prospects besides their table purpose qualities. A feasibility study may be carried out based on potential growing belts and farmers' acceptance to have a strategic plan in this direction.
26. A state where more that 50% of woman, particularly woman, children suffer from anemia , local indigenous leafy vegetables- reported to be pack house of nutrients, will be popularized through various incentives, massive awareness in urban, peri-urban and rural areas.

Spices:

27. In case of spices, while area expansion with suitable varieties in potential pockets will remain as a target area of intervention, equal emphasis will be given on production of field spices like coriander, cumin, flannel, etc as farmers of char areas in particular are growing such crops traditionally without any prescribed package and market support. These high value spices should be a focused area in other feasible areas also to augment farmers' income.
28. A special drive should be undertaken to cover all uncovered Arecanut plants as a support for growing black pepper on them as it is another low volume, high value, lress perishable crop at the disposal of farmers of almost all districts. Shade trees of tea garden are being gradually covered by black pepper, similar strategies can be adopted in all potential areas.
29. There are indigenous spice crops of Assam like Bhot Jalakiya, Bird's eye chilli, small garlic, bay leaf and tree spices etc yet to be explored, analyzed and see the marketability and prospect of value addition. AAU may come up with a strategy paper in this direction.
30. Market of raw Ginger being highly fluctuating and competitive, the govt. may explore for production of wide range of value added products of ginger by setting up suitable industries under PPP mode for buyback arrangement. There may be scope for developing own brand also with appropriate technologies to be offered by AAU. Similarly, the latest technology on processing of Turmeric, another more valuable spice of the state will be a focused area.

Flowers:

31. Floriculture is one of the fastest growing sector of horticulture-nationally, globally and Assam is no exception. The State has a very strong floriculture base traditionally owing to its agro-climatic situation, social inclination towards flower through amature gardening and wide range of floral diversity it enjoys naturally. A process has started by which flower is now coming out from homestead confines and moving towards a status of commercial floriculture and this is happening since 90s only. New generation farmers are now venturing into floriculture aiming market-which has become demanding, competitive and area of innovative floral products ei. Fresh flowers, dry flowers and lots of value added products impregnated with beauty components lucrative for the consumers. This market driven trend is clearly visible but lacks dimension and it is yet to scale up further if the potentiality taken into consideration. The floral wealth of Assam and NE is regarded by experts as a 'Sleeping Giant' and we need precise policies to boost up this sector as hereunder-

1. The floral wealth of Assam-seasonal, annual, perennial, ornamental trees, orchids, greens and ferns, hedge plants, ornamental bamboos, grasses, climbers, foliages, crotons and various wild beauties- is not yet documented in a comprehensive way which need immediate attention of all stake holders particularly by AAU. A collaborative approach may be needed to do it before it is too late. The gaps in works done so far by individuals/organizations may be looked into to come out with a full proof, picturised comprehensive document under computer system.
2. Arrangement may be made for maintenance of germ-plasm of all indigenous endangered species and in situ conservation of these natural beauties protecting them from over exploitation as it is happening in case of our valuable orchids. The cooperation of Department of Forest and inhabitants of forest villages will be indispensable in this case
3. A committee of experts comprising research, extension and promising floral entrepreneurs and organizations should be constituted to look into following aspects and finally come out with specific recommendations-
    a. Details of the pathway followed by Sikkim –may be with Dutch assistance and whether there is anything to be adopted by us.
    b. The model followed by Tamilnadu and Karnataka may have something to be followed after fine tuning
    c. The industrial policy of Karnataka has identified floriculture as a thrust sector for making it eligible for high scale incentives. Is it time for us to adopt a similar policy? Whether satellite farming system for orchids as it is practiced in South East Asian Countries like Thailand associating small growers around major cities by supporting them with required infrastructure and planting materials, under contractual buyback system is also feasible in Assam aiming external market.
    d. The R&D units of floral giants in South East Asian countries working on tropical orchids, have come out with fascinating varieties through improvement, selection and other breeding process. Can we initiate a similar agenda with more than 600 species of orchids at our disposal ?
    e. The Committee will finally submit its recommendation in the form of a action plan and roadmap for our floricultural sector, projecting deliverables and financial implications involved to go ahead in this direction gradually but in a time bound manner.

4. Efforts will be to develop a network of budding entrepreneurs to systematize production and marketing and explore uniform policy of intervention-finally to build up a strong floral base at Guwahati to have consistency in supply of floral products as well as to have volume. Other North Eastern states may have to be associated through interaction with them to move in this direction.
5. One of the most sought after traditional flower of Assam is an orchid called 'Kopuful' that is *Rhynchostylis retusa'* found wildly in Assam but now facing over exploitation.AAU may have to rescue the situation through its tissue culture laboratories by developing protocols and thereafter mass multiplication with all earnestness
6. Floral villages are developing around Guwahati as a consequence of ever increasing market demand. A model wholesale market for flowers in the line of metros, in an ideal location has to be set up in a most attractive way for the consumers. Cool chamber, market information centre may have to be part of it. This will be a step toward providing better price to the growers
7. It has to be seen whether needed inputs like seed materials, chemicals, vermiculite, moss, cocopit, sponges, implements etc are within easy reach of farmers at an reasonable price. Such subsidiary industries may be encouraged to set up locally to incentivize to minimize dependence on external sources which will minimize prices of those materials.
8. FPOs will be encouraged to venture into this sector and farm woman may also be encouraged to enter into floricultural world as a business activity.
9. AAU will explore all means of breeding, screening and improvement works keeping in view the competitive market. Emphasis should be given on scarce components like Lotus, Water lily of various types which has strong market demand locally. Off season production of Marigold, Tube rose are other areas of demand as external producers dominate the market in that lean period.
10. A focused area will be avenue plantation with local valuable ornamental trees like Sonaru, Ajar, Polash, Siris, Nahor, Simolu etc to beautify our cities, roads, parks etc. A coordination committee of all stake holders like country and town planning, Metropolitan Development Authority, Soil Conservation, Forest, PWD(Roads), Municipal authorities etc will be set up to explore landscaping and massive plantation in target areas
11. The National Research Centre for Orchids, (NRC-O), is set up at Sikkim-which is primarily dealing with temperate orchids. We need NRC on orchids for tropical

orchids in Assam exclusively to take care of tropical orchids of not only Assam but entire North East. The matter will be taken up with ICAR.

Medicinal & Aromatic Plants:

32. Over 7500 flowering plants are available in NE India and almost all are having medicinal properties. The steering committee of **National Mission on Medicinal Plants (NNMP)** Govt. of Assam has identified 34 prioritized medicinal plants for Assam state. This list has not encompassed the commercially viable aromatic plants. Most of the prioritized medicinal plants of Assam are wild and whichever few has been naturalized have their wild relatives in the forest ecosystem. The rural folk and tribal communities make use of different species of nature known for various medicinal uses. So, a well planned approach is required for its commercial cultivation and utilization. The use of plant based medicines is expanding rapidly worldwide and any economic activity relating to the growing of medicinal plants for commercial purpose is bound to be viable enterprise. MAP sector can be developed as a mean for sustainable economic development, set an affordable health care and conservation of biodiversity. Following policies will be adopted to boost up this sector-

    1. Contract farming and forest farming in forest villages shall be explored as sustainable way to ensure the steady and constant supply quality raw materials for drugs. R&D facilities shall be promoted to find out appropriate cropping patterns for incorporation of these plants into the conventional agricultural and forestry cropping system
    2. Development of high yielding varieties with the help of AAU will be initiated which should include proper cultivation technique, harvesting methods, safe use of fertilizers and pesticides and waste disposal.
    3. Promoting organic agri-technology for a sustainable production system of MAP will be initiated. The green technology is more necessary for MAP cultivation because of their use in health care system. Development of various Technology Transfer Tools shall be attempted and demonstrated by organizing training programme.
    4. Possible tie-ups with companies like Patanjali, Dabur will be explored for marketing of our raw materials, semi processed products to ensure better price to the farmers. A cluster approach in this regard will be encouraged.
    5. It will be explored whether coordinated effort with State Ayush Mission, Ayurvedic College, pharmaceutical companies is needed to boost up this sector in Assam and also whether policy intervention is required.

Mushroom:

This sector fits very well as a component for women empowerment on cluster basis. Earlier attempts could not maintain consistency in supply chain due to non availability of spawn particularly in summer months. All efforts will be made to address the gaps in the entire production and supply chain of activities which need technological and infrastructural intervention.

Apiary:

This sector has a need to expand from mini scale to medium scale aiming higher pollination and thereby higher production-besides income generation at farmers' level. Action will be initiated to make it a component of all ongoing schemes on oil seeds and fruits in particular and also as a major component for inhabitants of forest village. Awareness on necessity of this vital component in agricultural sector will be prime agenda in all training and skill development programme associating farm women also.

Policies on crop diversification

Nature has given Assam wide range of options in the entire agricultural sector though; primarily it is a rice base economy for the farming community-supported by the production system approach comprising horticultural crops like fruits, vegetables, flowers, spices, MAP alongwith mini sectors like apiary, mushroom besides various animals, birds and fishes. But time has come to see whether the global perception that paddy and poverty goes together-is also true for us also. Rice being an unavoidable component of our food habit, the question of sharing our crop lands between rice and market demand driven sector of crops and animals has come into picture to sustain highly competitive atmosphere. Not only economic security and food security but we are to nurture nutritional security at the same time and within the same available area for land based activities. Thus crop diversification in proper direction and magnitude has been an area of active intervention. Accordingly the Govt. proposes to move carefully in this direction keeping in view maintainability, ecology, farmers' acceptance and ensuring promising end results. Farsightedness needed for a dynamic market driven agricultural economy which will also be a base point in all policy issues. With this critical background, by and large, following policies will be adopted-

1. The whole exercise on crop diversification will be initiated from inputs, to be derived from research, extension, market behavior and farmers' response with clear projections on 'why' and 'how'

2. The modalities to move for gradual diversification from ongoing system has to be spelt out very precisely whether it will create any adverse impact on our biodiversity, ecology, soil environment, fragility of the target group.
3. It may so happen that there can be diversification to a certain limit only and not beyond that –which has to be looked into.
4. The overall logic will be economy but not at the cost of ecology
5. To overcome our limitations on needed infrastructure for post harvest handling and marketing, more emphasis will be given on low volume high value crops.
6. There are series of 'future crops' mostly in case of horticultural crops of Assam. Diversification towards those crops may have to be explored.
7. The end point of diversification will be, as far as practicable, processed or value added products by which more income is generated/ granted with significant margin over disposal of raw materials
8. A parallel agenda of any diversification may be to derive complementary benefit from associated components which may be in the form of soil health, organic recycling, production enhancement, marketing etc.
9. As diversification is adopted on commercial outlook, volume should be prime consideration to streamline produces not only to market but also to processing sector which needs consistency in supply.
10. Efforts should be made at district level by KVKs and extension agencies to develop a role model of diversification for the farmers of the area for exposure on the concept.
11. It goes without saying that establishment of systems of diversification of agriculture will enable the development in allied sectors such as live stocks, poultry, dairy, fisheries etc. to generate added income to the farmers and may facilitate entry into external or even export market. This is the status targeted to achieve under diversification in Assam by the aforesaid policies.

Policies on Organic farming

The status and the issues-

Keeping in view the organic production system followed traditionally in Assam, growing awareness on importance of organic farming, even exploring markets for organic producers, several schemes were implemented in Assam during last few years. Pilot projects were taken up to produce organic Joha rice and Sugarcane with a promising response from external buyers. About 4500 ha area is covered under organic farming. It was also targeted to cover 50 ha under organic farming in each 126 assembly constituencies. It is reported

that out of 60 such units covered, 12 units could obtain organic certification and the rest are in the process. Crops targeted to bring under organic cultivation are –Joha Rice, Red Rice or Bao rice, King Chili Orange, Pineapple in different organic belts of the State. The experience gained through these initiatives failed to project a consistent trend of organic farming in the State and gaps in these initiatives needs a relook with following policies proposed to be adopted in days to come-

1. It may not be advisable at this point of time to phase out chemical farming completely. Thus a crop-specific and location specific module will be adopted after critical survey of market demand of precise products and possibility of adoption by farmers in specific areas-i.e. farmers acceptance
2. While selecting crops, the market demand will be the prime factor. The quality for entering into competitive market, consistency in availability of raw materials, prospects of value addition, processing facility will be other aspects for consideration.
3. Before starting an organic farming, it has to be ensured that all required bio-based inputs are available or can be sourced easily by growers
4. The whole concept being technology driven, it will be mandatory to build up a system of continuous technology back-up to all concerned including farmers and also monitoring at all stages of implementation.
5. To obtain organic certification, all pre-conditions, rules and regulations (including NPOP) will be adhered to in a transparent way. The financial back-up needed for the purpose will be ensured prior to initiation of the project.
6. To bring the State into organic farming system, the approach will be in a phase-manner with a modest target of around 5 lakh ha and the experience gained in covering this 5 lakh ha to organic farming, the whole approach will be fine-tuned for a massive drive subsequently in this direction. It has to be ensured that income of the farmers from organic farming does not suffer-rather increase.
7. Market tie-up through internal/external buyers for the organic produce will be continuously explored by participation in periodical forums/buyers-sellers meet/exposure conclave etc. initiated by Govt. and private organization inside or even outside the country.
8. In the event of any adverse market situation, the Govt. Agencies will intervene to save the situation in the interest of famers.

9. Keeping in view the national policy to make North East an organic hub for the country as well as external market, it is proposed to initiate 'Assam Organic Mission' for mission mode approach towards organic farming.
10. Keeping in view to give specialized focus attention on organic farming comprising all sectors of agriculture including animals, fishes etc, to go for capacity building for new generation farmers, to provide a comprehensive platform to agripreneurs and external buyers, to constantly update knowledge on organic farming including processing, packaging, bio-packaging etc and to ensure regular flow of bio-inputs into the field, it will be actively explored either to set up a separate Directorate of Organic Farming or alternatively a state of the art Institute of Organic Farming with required infrastructure and man power.
11. Besides departmental farms, the KVKs scattered over the State will be entrusted to develop model organic farm either in their own premises or departmental farms or as on farm module in farmers' field to project the technologies and economics of organic farming. Required financial back-up will be ensured.
12. As availability of all required inputs is a crucial issue the State shall take following measures-
    i. Production of organic seeds: Starting with rice, the State shall take steps, in collaboration with the University and private players to produce organic seeds of selected crops locally
    ii. Production of other organic inputs mainly the bio-fertilizer and bio pesticides will be taken up from the first year itself to facilitate organic agriculture. Approximately in 20% area i.e,5 lakh ha around 11 lakh MT of bio-fertilizer shall be needed. The Govt. will work out the detail requirement and production plan taking into account the support from GOI for organic agriculture in the NE.
13. Organic food storage and marketing infrastructure shall be put in place
14. The State shall also develop its organic food packaging and branding facilities
15. Organic certification being a complex issue, one state or regional organic certification agency –acceptable to all concerned shall be promoted taking into account all technologies and supports needed-which may be AAU or ASSCA or any other organization.

Policies on revamping departmental farms, Progeny Orchards, Field Trial Stations and Agriculture Farming Corporation

There are about 49 departmental seed farms, 16 progeny orchards and eight field trial stations lying almost idle and many of them are facing the problem of encroachment and degradation being uncared for. During nineties there was an attempt to lease out those farms to private sector under terms and conditions. But in many cases the farms were misused, underutilized or unutilized due to lack of close monitoring, ignorance of the lessee about technologies and other problems of infrastructure. This being the situation, it is high time to restore those valuable farms as those unique assets of govt. can be hot bed of many farming activities –having ultimate bearing on the farming sector of the State. Following policies will be adopted to revamp those farms-

1. A detail feasibility study will be conducted encompassing each idle farm to find out the best possible intervention to make them vibrant. A team will be constituted for the purpose drawing experts from research and extension to submit a detail report projecting infrastructures needed including human resource requirement and financial implications or policy decision needed if any
2. On receipt of this report, Govt. will explore following options
    a. Farms will be operated by department of agriculture for specific purpose like seed production, nursery, raising mother plants for a scion bank or carry out trials on innovative practices and technologies
    b. May be handed over to ASC/ASSCA to fulfill their objectives of generating seed stock etc under terms and conditions
    c. Hand over to promising FPOs to carry out their agribusiness under terms and conditions
    d. Hand over to unemployed agricultural graduates to carry out precise agri-oriented activities under terms and conditions
    e. Hand over to AAU under terms and conditions to utilizes them for production of planting materials or develop them as model farms under KVKs or as a site of technology showcasing
    f. May be utilized for agri-related activities under PPP model-associating new generation farmers with precise mandate under terms and conditions
    g. Govt. may also consider to utilized these farms as centre of excellence to showcase frontier farming technologies and any innovative projects like agri-horti-tourism, farm machinery hub, technology park, setting up precision faming

module, high-tech horticulture, centre for advanced training and skill on agriculture etc.

Policies on Agricultural Farming Corporation

A committee will be constituted to study in details on the present status of AFCs scattered over the state and suggest measures for optimum utilization of available land under this corporation.

Policies on Post Harvest Handling, processing and value addition

The status and the issues-

More emphasis on higher productivity and less concern about minimizing post-harvest loss and unaware about importance of processing and value addition is the situation prevailing in Assam. Lack of awareness, infrastructure related problems, lack of market access and above all lack of orientation on the whole issue from farmers' level onwards, are the factors behind this sluggish status of this sector. A save grain campaign was initiated to project that a grain saved is a grain produced. In case of fruits and vegetables, the Department of Agriculture set up Fruit Processing and Preservation Centres almost in all districts targeting farm women empowerment and as an outcome few processing units came up in commercial line and still functioning. Few medium scale processing units also came up with Potato derivatives as main product, local vegetables for pickle making, various fruits for juices etc. but considering the importance and potentiality, this is insignificant and deserves expansion. Keeping all these issues in view following policies will be adopted to improve the situation-

1. Complete package on post harvest technologies for various crops will be popularized at production level
2. Each and every aspect of post harvest technology –from pre harvest treatment to optimum time of harvest, maturity index, cleaning, grading, value addition, ideal packaging, bio-packing, labeling, display, application of growth regulators for enhancing shelf life, transportation module for short duration and long duration transportation, staking, aggressive advertising etc. will be brought nearer to farmers- to minimize post harvest loss from field to market and enhance their market competitiveness.
3. The AAU will be suitably strengthened to put its post harvest technology department to take care of post harvest research on wide range of products and their sustainability including gene based technologies for enhancing shelf life.

4. There will be provision of out sourcing technologies developed elsewhere even in private sector which are feasible in our situation in different locations and pockets of production of crops, animals and fisheries as well.
5. The infrastructure development/being developed by Industries Department, like export promotion industrial park at Amingaon (EPIP), North East Mega Food Park at Tihu and other facility centres in different parts of the State will be mobilized to accommodate upcoming agri-horti processors on liberal terms and conditions including FPOs.
6. Commercial growers, marketing, processors, exporters will be provided linkage with Indian Institute of Packaging (IIP) coming up in the State.
7. Linking fresh products for fresh market, processed food to the market shall be facilitated through refrigerated transport means under programmes of NHB, APEDA and other ongoing schemes like RKVY, NFSM etc.
8. Food quality testing laboratories/establishments will be further strengthened
9. Experts say that 'never send anything raw from Assam, put value to it and send-you will be gainer'. This will be the general outlook in post harvest sector of agricultural produces.

Policies on Farmer Producer Organization (FPO)

This is a new initiative to encourage group approach in farmers in two ways that is by providing matching equity grants and secondly credit guarantee fund-and named it as 'equity grant and credit guarantee fund scheme for Farmer Producer Organization'. Organizing resource poor farmers in the form of FPO to address many challenges of agriculture particularly in case of accessibility to investments, technologies, inputs and most importantly market-is the logic behind this initiative. This is a new initiative in Assam but gaining popularity. The initial experience suggests that it may be necessary to set up some way side collection centres, cool chamber for extending shelf-life of perishables and thirdly the infrastructure created by Industries Department in food parks, EPIP and other such unutilized or underutilized infrastructures may be useful for FPOs. They have also requested for transportation arrangements (like mini trucks) for the produce. It will be endeavor to encourage FPOs for their proper functioning so that a role model is created. They may have to associated in implementation of flagship schemes like RKVY, NFSM etc. after critical assessment of their performance. If needed, provisions will be made to safeguard promising FPOs with handholding supports to work as per our local situation at field level for enhancing their efficiency on the basis of feedback on their functioning in the days to come.

Policies on char areas

It is reported that about 4.6 percent of total land area is under riverine chars accommodating more that 9 percent of the total population of the State. Wide range of crops is being cultivated in those areas traditionally and to some extent on commercial outlook. Even high value field spices like coriander, cumin, flennel etc are grown. This proves that a vast area is awaiting intervention from research as well as extension. As such following policies will be adopted-

1. Demarcation and documentation of basics of char areas, if necessary through satellite imagery and identifying areas for crop planning. The Char Area Development Authority may also be associated in this process.
2. AAU will come out with specific package and recommendation for each specific char associating local KVKs and project priority area intervention for extension and finally farmers.
3. Explore all possible tie up of farmer with processing, semi-processing and marketing channels aiming better price to the growers.
4. It will be explored whether FPO module can be laid down in those areas by overcoming infrastructural problems if any

Policies on phasing out shifting (Jhum) cultivation

To do away with this primitive method of farming by highlanders of Karbi Anglong and Dima hasao districts which had detrimental impact on climate and ecology, various initiatives are being taken up by the Govt. through local councils. Paucity of authentic precise information on progress in this direction and present status is a constrain. Satellite imagery may be useful in this case. As such it is proposed to frame out a status report on sifting cultivation of the State. Secondly the regional KVKs of AAU will be asked to project viable technological intervention needed and finally a policy will be adopted to implement an action plan in a time bound manner in consultation with local councils.

Policies on urban agriculture

Urban agriculture is a relatively new concept and a latest addition to it is vertical farming. Out sourcing spaces available in urban, peri-urban or semi urban areas for gainful agricultural activities is an emerging and promising area-which can contribute enormously towards fresh production of fruits, vegetables, flowers and other animal farm products even

in mini commercial scale through group approach as a demanding city market is just adjacent to them. Some vital advantages of this type of farming are that they can contain air pollution, improve micro climate of home-stead (as reported by NASA recently, house hold ornamental plants like Aloevera, Areca, Ficula, Ivy, Basil (tulsi), snake plant etc. are very dynamic in release of Oxygen –and naming them as Oxygen plants) contribute towards aesthetic culture and landscaping, waste management through organic recycling etc. Spaces available under homesteads, way side areas and dividers of highways in cities, roof tops, open areas of recreational parks, various institutional gardens-educational, industrial and real estate etc. can be ideally targeted for urban agricultural planning. Such type of planning can be vary conveniently taken up in newly developing towns and cities and other areas with creative interventions from beginning and such proper landscaping is the need of the hour. Summing up all these issues following policies will be adopted-

1. Massive awareness programme for the city people will be initiated to project importance of such farming-gardening for their own safety, health and economy. This will also definitely add to 'Swach Assam Abhiyan'
2. Research on this aspect by horticulture division of AAU will be encouraged. Even a minor scientific intervention may give great mileage
3. It will be explored –whether it can be made mandatory for departments like country and town planning, municipality, city metropolitan development authority, soil conservation etc to accommodate horticultural experts in their department –even by creation of posts aiming most modern landscaping of city areas and its peripheries with components of landscape architecture

Policies on streamlining PSUs services in agricultural sector

There are several public sector undertakings under Govt. of India and Govt. of Assam working with their own target oriented approach maintaining limited coordination with state department of agriculture. When the target group is same that is the farming community, it has to be transparent to all stake holders –who is doing what in various fields of agricultural activities- crops, animals and fishes. In order to bring about a close coordination amongst all those stake holders, to learn from each other's experience, to derive complementary benefit between schemes to fine tune if necessary the services provided by them following policies will be adopted.

1. A steering committee will be set up headed by Agriculture Production Commissioner to review periodically the status of implementation comprising following organizations-

a. National Horticulture Board, Guwahati
b. Spices Board, Guwahati
c. Coconut Development Board, Guwahati
d. Small Farmers' Agri-Business Consortium, Guwahati
e. North Eastern Regional Agricultural Marketing Corporation, Guwahati (NERAMAC)
f. Assam State Agricultural Marketing Board, Guwahati (ASAMB)
g. Rubber Board, Guwahati
h. Assam Plantation Crop Development Board, Guwahati
i. Assam Industrial Development Corporation
j. State Ayush Mission, Assam, Guwahati
k. Assam Seeds Corporation
l. Agricultural Product Export Development Authority (APEDA)
m. Representative of AAU
n. Private sector in the field of agribusiness (to be identified)
o. Director of Horticulture and FP, Assam

The Director of Agriculture will be the coordinator of this forum

2. The logic behind this initiative is to make them more and more farmer friendly, consumer friendly and explore whether any new initiative is needed in this direction through technological and policy intervention.

Policies on convergence building

It goes without saying that "everything else may wait but not agriculture' so in order to take timely decision at Govt. level and expedite the official formalities considering seasonal factors in agriculture, the state may consider forming an Agricultural Cabinet by drawing ministries like agriculture, animal husbandry, fisheries, irrigation, soil conservation, power and finance so that one can complement the need of others for on-time delivery of agricultural inputs

Policy on agricultural labour

Out of about 18.45 lakh agricultural labourers, 11.29 lakh are male and 7.16 lakh are female labourers. This is an unorganized sector but contributing enormously in the agricultural production system besides their own wage earning life style. There is almost no provision to reach this sector of our society by most of the ongoing schemes as they are not in the receiving end of any benefit. It is proposed to

explore-whether they can be provided settlement, provision of house sites, made free from debt if any, health or insurance support or top of all whether they can be transformed from the status of unskilled to skilled status-through awareness programme, training and skill development on various land based and micro industrial activities-tailored with credit support

Policies on disaster management

The status and the issues-

Assam has 4.75 lakh ha chronically flood prone areas which is 17.3 per cent of the net area sown. The magnitude of the problem has a distinct trend of increase in area of devastations by flood water and also due to silts carried from neighboring hilly states which are settled in the riverine areas and river bed. This disaster is frequent destabilize of the farmers' economy. Another consequence of flood is the problem of erosion in riverine tracts which is also becoming alarming wiping out villages. Secondly Assam experiences draught like situations in different district in different seasons. The chronically draught prone area of the state is 0.94 lakh ha which is 3.4 percent of the net area sown. A third issue in the form of disaster is also emerging in a localized way in crop fields adjacent to forest areas that is havoc created by elephants. Wild elephants are damaging paddy fields and other crop lands in human habitats. With this background it is proposed to frame out policies to minimize impact of disasters on our farmers –other than the erosion issue which is already discussed under soil head in the aforesaid discussion.

1. It will be mandatory for all the district authorities to prepare contingency plan on flood to minimize impact of flood and to tackle it systematically-which may occur early normal or late in the monsoon season. The contingency plan should encompass crops and animals as well –projecting emergent, short term and long term planning besides post flood measures. The financial implications will be part of the plan
2. The department will prepare a master contingency plan for the state accordingly and this exercise has to be completed by April each year and forwarded to the Govt. for approval and sanction.
3. The department of agriculture will be in constant touch with the control room set up by district administration to monitor the situation and for immediate action.
4. Based on proper assessment of damage of crops/animals, initiate suitable measures, provide technical guidance to farmers including input support besides associating local KVKs whenever needed.

5. A similar exercise for draught like situation will be carried out on war footing if disaster like situation occurs to save crops from damage by exploring all means of life saving irrigation.
6. Pre-stocking of varieties of seeds of crops developed by AAU for such moisture stress situation (also varieties developed as flood tolerant varieties etc) will be initiated to escape from total crop failure which will be followed by package of input support if needed in the following season-to make up the loss of farmers
7. In the event of late flood which is more damaging, tillage becomes a serious issue to go for next crop. So in the contingent plan, provision of tractorisation by mobilizing all available tractors/power tillers should be invariably incorporated.
8. Fodder and feed availability for the animals, chemicals and other means to combat any likely emergent's of pests of standing crops under post flood situation, strategy for silted areas etc. should be invariably a part of the contingency plan so that resource poor farmers are supported for their confidence building
9. In case of man elephant conflicts-, coordination with Forest department is a must and a joint effort will be needed to frame short term and long term strategies including measures like developing wild banana plantation in feasible areas of the forest, live fencing with thorny crops like Assam lemon, bordering crop fields and other affective measures reported to be successful elsewhere. A joint Action Committee involving local farmers' organization, officers of the agriculture and forest department will be considered for planning and execution.
10. Provisions for deriving services of disaster management force or SDRF in agricultural sector when the situation demands immediate interventions like deployment of plant protection squad to contain large scale pest attack in epidemic for, protecting crops from damage by elephants, immediate distribution of seedlings amongst flood effected cultivators becomes necessary, tractorisation of large area within a very short time-considering the seasonal factor becomes an issue etc. will be explored.
11. Measures like flood forecasting and warning, demarcation of silted areas from light to heavily silted areas, management of flow of water at their sources, finding ideal sites for aforestation etc will be explored with latest technologies like satellite imagery , remote sensing, computer based mathematical watershed modeling, GIS information system etc. A multidisciplinary high level committee involving concerned departments and AAU will be constituted as a measure under long term planning.

Policies on knowledge transfer –changing role of extension system

The status and issues-

Aiming transfer of technology to farmers level the Department of Agriculture was created in British era and till 1977, the entire approach was unsystematic and merely demonstration oriented. Then came the training and visit system in 1979 designed by Dr. Bennor with a comprehensive outlook to touch each village and each farmer directly or indirectly with a precise schedule of training and field visit with transparency and accountability of the extension machinery-maintaining a distance from input delivery and keeping technology transfer on top most priority. It was recognized as a most effective system of agricultural extension-but later died down due to lack of needed support and other factors. The momentum created by T&V system faded away and new initiative started during later part of nineties in the form of Agricultural Technology Management Agency (ATMA) alongwith SAMETI. The system, because of its inherent gaps, could not deliver the desired objective and there are enough reasons to opine that the scheme is a non-performer except rare success stories. So, time has come to relook into the whole issue whether the extension machinery is capable to cope with the fast changing and competitive agricultural scenario where vital issue like doubling farmer's income, efficiency, retaining youth in agriculture etc. are emerging and demanding a vibrant and dynamic extension system. Based on these ground realities, it is proposed to lay down policies to strengthen the extension machinery in the State as hereunder-

1. The beauty of the T & V system was that, posts at various levels were created aiming to touch farm families in 1977 whene the number of agricultural holding was 22,54,650 (Economic Survey of Assam-2016-17) and in 2011, the figure is 27,20,220. Upto 2011, the increase in agricultural holdings is 4,65,570 and it can be speculated that in 2017, it may attain a level of 5.00 lakh approximately. Thus to speak the truth, these 5 lakh farm families –whose holding size is also reduced from 1.37 ha in 1977 to 1.10 ha in 2010 is almost left out by the extension machinery-as no new posts are created to cover them. This is a physical gap beyond the coverage capacity of the existing extension machinery. So, creation of adequate no. of posts will be a prime area of intervention under the policy intervention.
2. The knowledge of the grass root level field functionaries is not in conformity with the fast changing agricultural situation but capacity building of farmers depend on them. The knowledge that was gathered decades back is not much relevant in these days of market oriented crop planning. So, orientation of field functionaries will be prime agenda.

3. To maximize potentiality of the extension machinery to contribute for development of agriculture sector, it will not be confined to capacity building but providing congenial environment to extension functionaries and required infrastructure will be created or provided to them.
4. Extension personal will have to acquire latest technology as well as skills in use of various electronic devices such as computers, multimedia, internet etc.
5. The potential of the agricultural officers will be fully tapped by providing adequate in service provisions, for acquiring higher qualification of M.Sc or Ph.D in specialized sector. At least 20 persons may be deputed each year for higher studies within or even outside the country for sharpening their experience giving preference to frontier technologies, emerging issues of technologies, agribusiness, ICT in agriculture, high- tech horticulture etc.
6. Farmers, particularly new generation farmers are changing their attitude and a substantial part of them interested in commercial segment-which entails high value enterprise, superior technology, large investment and rigid product specifications. So, the extension services should be in a position to meet their inquisitiveness and offer high grade information and technology.
7. It will be explored whether at least one 'Krishi Projukti Park' can be set up in each district –associating farmers, DOA, KVK and even private sector as a model unit comprising ingredients of production systems i.e. crop, animals, fishes etc,
8. The role of farm women being indispensable in agriculture, their capacity building particularly in sectors like apiary, mushroom, nursery management, vermicomposting, processing, marketing, floral enterprises etc. will be prime agenda.
9. Skill being a vital part of education, the extension machinery have to be equipped adequately to carry out extension by sifting their mode from 'talking type extension' to 'doing type extension'. An Agricultural Skill Development Centre for skill development of new generation farmers, village level workers, farm women etc. will be set up to facilitate developing entrepreneurship amongst them and engage themselves in self employment. Credit support from banks to such trained and skilled entrepreneurs can also be explored.
10. The VLEWs are being the immediate 'neighbor' of farming community, they are to be adequately sensitized and incentivized with adequate support and care.
11. The entire extension machinery will move in a crop specific, location specific, technology specific module with market oriented approach in totality.

Policies on education and research

The status and issues-

The Assam Agricultural University was established in 1969 at Jorhat by upgrading the College of Agriculture and subsequently series of colleges were set up on allied sectors of veterinary, fishery, home science with more campuses in different locations. Thus the University became solely responsible for human resource development as well as take up research activities. Besides, the University has a network of RARs and KVKs covering all districts of the entire state. As regards education, the AAU may need to revisit each curriculum in the context of wide range of changes that are taking place in the agricultural sector not only in Assam or India but globally and it has to be more and more relevant to the present day needs of the students. Paradism shift may be necessary to benefit the target groups as well as to strengthen the faculty. While the education in basic science is imperative, the higher education part has become demand driven vary significantly. Same is the case with research also- which has also to be largely demand driven. This demand may come from market, industry, entrepreneurs, new generation farmers, premier organizations or manufacturing sector who wants fine tuning of ongoing technologies to be more cost effective or environment friendly and so on. Advance research elsewhere in the country or abroad may have to be structured to fit our situation. Innovative and creative research may have to be initiated to keep pace with R&D units of MNCs and market players. The AAU has positioned itself as one of the top agricultural university of the country, and this commanding status may also have to be reflected in agricultural scenario of Assam .Thus expectations are high naturally to bring about significant change in our agricultural system having lot of limitations but it has inherent strength of biodiversity, bio-resource and locational advantages to capitalize for future planning to make Assam a premier agricultural state of India. In order to proceed in this direction following policies are contemplated to adopt in the days to come.

1. The Assam Agricultural University will be adequately supported in all its endeavor to adopt a most modern and relevant education and research policy –as discussed above
2. Students are either job oriented or research oriented. AAU will have to nurture both with different strategies – the former, on completion of education, will opt for job in wide range of areas like bank, insurance, industry, management, departmental jobs etc. Their competency will be based on curriculums offered to them. The 2nd group will have to be build up on the basis of need based research or demand driven research and in this case AAU may come up with futuristic outlook considering all

technological advancements and revolutionary changes and trends in the entire agricultural sector.

3. While prioritizing research, issues confronting our farmers like quality, marketability, stress management, cost effective tools & methods, soil & water health, input use efficiency, climate change etc. may be incorporated.
4. As on today, it is felt that there is great need for market oriented research to make agriculture in Assam more and more competitive.
5. Skill development will have to be a great part of our agricultural system. Building competency in each micro component of agriculture like apiary, mushroom, MAP, contractual farming in dairy, poultry, feed production, marketing strategy, sourcing and channelizing products to markets, land based activities like bio-packaging, organic farming, mushroom production technology, vermicompost production, organic recycling, product diversification, nursery, value addition, landscaping, use of audio-visuals and filming to pick up grass root level success stories including magnificent ITK range of not only Assam but covering neighboring states etc. This will develop professionalism and give greater mileage in securing self employment, income generation and bring vibrancy in the whole sector and it will play a vital role toward retaining youth in agriculture. The Govt. will give all needed support to AAU to cover this entire spectrum of activities may be with diploma or certificate courses
6. It is expected that success stories like AMUL, the model nurtured by Bangladesh leading to Nobal prize by Muhammad Yunus in involving resource poor farmers for their income gain and such other success stories elsewhere will be analyzed by Ph.D scholars to find out the links in the chain of social, economic, technological tie-ups and that too with innovative approach. There is no point that AAU should not take up such off campus, off state, and even off country success modules as subject of their research. The logic behind this policy is that we are to be fore- runners in the competitive agricultural world and imbibe technologies, ideas, innovations to fit it into our situation. The Google may be hunting ground for our scientists.
7. If felt necessary, AAU may also explore collaborative research with any partner which may with other states, countries, performing companies with precise mandate and time frame-to arrive at a win win situation for both the parties.
8. Time has come to sit with industries sector, formally or informally and periodically to know their current and likely demand in coming year of agro-based human resource and frame up our curriculum accordingly. It is a practice of southern states. We have more than 700 big tea gardens but it will be difficult to find a few agricultural graduates in them. They are to feel that a little technological intervention can give

enough mileage and they have ample scope for diversification for additional income. For example, tea tourism is still a neglected baby-but an emerging area proven already by Kerala.

9. It is expected that, all major practicable, cost effective research findings-which can project economic gain at farmers' level, will be regularly updated in the university website for the knowledge of stake holders in the department of agriculture and other field functionaries. It will minimize the gap between research and extension. The DOA should also give its feedback regularly and see if any fine tuning is needed. They may also suggest research priorities that AAU may consider. It will be added advantage if progressive, new generation farmers can be associated in this exercise. The Governmet may consider to constitute a forum for such regular interactions. The logic is to strengthen ties amongst AAU, DOA, farmers and other stake holders. The experience of retired officials, scientists may also be counted in this forum.
10. The KVKs in the districts and district officials of agricultural department are expected to monitor vary closely farmers initiatives who adopt commercial cultivation practices without looking various vital aspects like degradation of bio-resources, environmental consequences particularly soil environment, threat to flora and fauna, likely extinction of valuable germplasm, valuable traditional practices etc.-which may be due to their ignorance. Research may be necessary for a package in such situation for a balance between economy and ecology. For example wiping out orange plantation in Upper Assam by small tea gardens, totally discarding age old citrus plantations, pineapple plantations etc. by large scale plantation with rubber surrounding Goalpara district etc are some of the disturbing trends today and thus research may come into picture.
11. Agriculture, horticulture and allied sectors should be a part of school/college curriculum to nurture their creative feelings towards nature, aesthetic feelings, economic and ecological importance etc. AAU may suggest 'common minimum programme' for various levels of students in this regard.
12. Some of the latest emerging areas are agri-business, management, IT, biotechnology, climate change, natural resource conservation, gene bank, high-tech horticulture, nano technology, various bio products including bio packaging, recycling of organic wastes, and bio-resources, DNA finger printing GI tag etc. may be duly emphasized in research programme. Prioritization and re-prioritization vital areas may be regular practice in the days to come.
13. AAU may explore for entering into 'technology business' to compete with private sector and for its own economic gain for further investment in the line.

14. Release of technology, hybrid varieties which have significant improvement over the prevailing technology/practice may be considered for release without delay by the evaluation committee of AAU
15. The AAU will be made more accountable to lead a technology driven agriculture benefitting each stake holder in the process and farmers in particular.

Policies on empowering farm women in agricultural sector

The Govt. and other agencies have initiated series of initiatives and schematic support to strengthen woman in general but when the target group is farm women, they are yet to be empowered adequately. Agriculture is largely dependent on them and they are even decision maker at family level, and also major source of farm labour requirement in the farming process. The dependence on farm woman in rural areas of Assam and tribal belts in particular to carry out various agricultural activities is very mush significant and almost very near to the status 'totally dependent' on farm woman. But their association with various agricultural operations and the mode of operations are still of traditional and cumbersome type and to some extent over burdening. This is an undesirable but unavoidable situation still prevailing. Thus there is gap in initiatives or interventions if we are to benefit such farm women who may need even hand holding support. There are technologies which are sure to be quite useful for them, well fitted in the entire production system which includes crops as well as animals. Keeping in view this status of farm women, it is proposed to adopt following policies for empowering farm women-

1. Schemes to empower farm women will be prioritized, implemented.
2. Massive awareness programme on latest farm technologies covering implements and women friendly machineries will be initiated.
3. Farm women will be given exposure visit on success stories and technology showcasing sites.
4. Adequate provisions will be made for development of their skill on wide range of agricultural activities like apiary, mushroom, nursery, vermicomposting, goatary, poultry, fishery etc. with incentive.
5. It will be explored whether FPO type initiatives can be taken exclusively for farm women to bring about a commercial atmosphere in their activities.
6. Loans with low interest rate should be provided to woman in agriculture to encourage them to take up agriculture as a business activity.
7. Woman development programmes may be designed in a way that the services and skill of woman can be gainfully utilized in relation to their involvement in any agribusiness type of activities.

8. The expertise of KVKs will be utilized to sort out specialized awareness and skill teaching programme exclusively aiming farm women of the area for their motivation. Training need analysis (TNA) will be a major exercise in this regard.

Policies on farmers' welfare

While the entire exercise of this policy documents is aimed at welfare of farmers, some precise policies will be initiated on the overall issues –by and large uncovered or partly covered to benefit them directly.

1. In order to attract and retain youths in farming, agriculture shall be restructured into a business mode like that of an industry where the crop fields, animals and fishes shall be industrial factories and the inputs (seed, feed, fertilizers, machineries etc) suppliers shall be raw material suppliers to the above factories for production of factory outputs in the form of grains, vegetables, fruits, milk, egg and fishes etc. and factory by products like renewable energy (biogas), meat, meatmeal, bonemeal, fishmeal, cakes from oil seeds, leather etc.
2. To support the above, the state shall build up convergence with the associated departments to assist the farmers under the flagship programmes of the Govt. like issuance of soil health card, facilitate micro and drip irrigation, crop insurance, schemes, start up India, NMENREGA and skill India, ENAM etc. The state shall also ensure delivering the quality deliverables on time for production and productivity doubling and thus the income to farmers.
3. The state shall also take all measures to position the farmers on organic path and promote higher dividends from their farming.
4. Aiming good governance and fresh feedback periodically a Farmers' Commission will be constituted associating farmers and experts of agriculture sector including research, agripreneurs and market specialists. This will be non political commission and play advisory role for betterment of service delivery system at farmers' level besides associating with State Innovative and Transformation Authority (SITA) on issues to be prioritized from time to time in the interest of farming community.
5. The minimum support price for all agricultural commodities produced in the State shall be considered based on the report of the cost of cultivation centre, a Govt. of India setup attached to AAU
6. The state shall also increase its farm produce procurement capacity to the level of at least 50 percent of total produce so that farmers do not suffer from market gluts

7. Farmers' organizations like FPO shall be taken as partners while framing new approaches to farming and farm related trades.
8. In order to address the issue of unavailability farm labours the Govt. shall consider mechanization by setting up an Agricultural Engineering College cum manufacturing centre of prototype farm machineries suitable for small holders farming situations.
9. In order to encourage double/triple cropping without compromising with soil health, the govt. shall explore establishing series of Gosalas accommodating suitable number of cattle in each to control and contain open grazing as well as for facilitating the use of cow urine and dung from local cattle.
10. The concept of Smart Farming in small villages shall be explored focusing on the niche area of crop/animal of that village with other than niche crops/ animals supporting and backstopping the niche area crop/animals
11. In order to counter the spurious seed which is a major cause of farmers' grief, the ASSACA shall be completely restructured with adequate manpower therein. Similarly measures to contain the spurious fertilizers and chemicals shall be taken through a process of random certification after the supply has been made
12. The state shall also consider giving pension to the farmers above 60 years of age and also earmark a fund for assistance to the farming families while they suffer from diseases like cancer that demands costly treatment. Alternatively, mediclaim type of insurance for farmers shall be explored.
13. The state shall device mechanism to promote high value and hi-tech farming modules.
14. Farmers associated in share cropping under absentee land ownership, when the land on which they cultivate is not belong to him, will be safeguarded with appropriate intervention.
15. Farmers devastated by flood, erosion, draught like situation, debt ridden, needs special consideration and hand holding support to survive and restore their confidence. It will be explored whether they can be covered by all welfare measures provided by various departments, contingency support by providing 'relief fund or relief loans' etc. aiming relief with short term and long term measures.

Policies on agri-business

Linking agriculture with agri-business is a necessity now as agri-business has entered an era of vibrant business activity. It goes without saying that agriculture is gradually becoming high-tech and technology driven, becoming more global, farmers getting tech - savvy and new horizons are unveiling. Even MNCs far away from agri-business, are now showing keen interest in agri-business. The latest examples are Reliance, Haldiram besides

the Patanjali, Dabur who are eying NE to encompass under their network. Retaining youths in agriculture is an issue that demands business oriented module for them. Besides, employment and income generation, agri-business only can nurture their aspirations to venture into agro based business module –however small it may be to start with. They have the understanding of rural life and problems of farmers but there may be new generation farmers/ farm women with entrepreneurship qualities who would like to start up agribusiness. In Assam, by and large, agribusiness is a dormant concept but promising reports of budding entrepreneurs in agriculture sector on individual or group basis are pouring in –though very few in number. So, recognizing the urgent necessity to project agribusiness as a most viable enterprise following policies will be adopted-

1. AAU will play a very aggressive role with needed curriculum and provisions of skill teachings on wide range of potential areas for agribusiness in Assam, to bring commerce into agriculture in Assam.
2. Aiming primarily to equip agri-graduates in this line, certificate course or diploma course should be parallely laid down for new generation farmers. The agribusiness education is in a state of growth and this growth is to be sustained with quality education to transform the targeted group into dynamic entrepreneurs.
3. Farm credit will be streamlined besides Govt. sponsored schematic support to promising players in agribusiness sector in Assam.
4. Promising FPOs will be encouraged, to venture in agribusiness with resources available and through schematic support.

Policies on Bio-diversity

Proper identification, documentation and preservation of our indigenous crops, farm animals, fishes having most valuable traits is necessary before they face extinction under the pressure of commercialization, encroachment, rapid urbanization etc. They are termed as breeder's paradise. No systematic and comprehensive effort in this direction has been taken up so far except some piece meal effort by few agencies. So following policies would be adopted in this direction-

1. The State have an enviable floral and faunal bio-resource and the policy is to translate this bio wealth into bio-economy by prospecting the vast gene pool hidden in them and utilizing them in production of stress tolerant varieties and even health protecting pharmaceuticals
2. Presently, the Forest department under the aegis of National Bio-Diversity Authority is engaged in this sector. The role of state agriculture and other line departments and the university are missing. Together a data base on the bio-diversity shall be

developed and the potential of the genetic strength of this bio diversity assessed for developing suitable cultivars on one hand and promoting the specialty resources for national and international trading converting thereby this wealth into economy

3. The endangered and likely to be extinct bio- resources as identified by International Union for Conservation of Natural Resources (IUCM) shall be immediately conserved ex sit while taking up appropriate measures to conserve the less endangered one in situ with the help of National (Ministry of Environmental Forest, Agriculture and Farmers' welfare, ICAR) and international (Food and Agricultural Organization, Rome) agencies.
4. Establish a research and training institute on agricultural bio-diversity preferable in Kaziranga/Manas/Pobitora area and incentivize annually the bio diversity conservationists of the State
5. Strict vigil on invasive alien species and alien genotypes with effective measures for their eradication.

Policies on Biotechnology

The status and issues-

Agricultural biotechnology deals with biotechnological interventions for improvement of crops and livestock. It has become an integral part of any planning process when aimed at food security. As a most promising modern science, it can contribute enormously towards raising productivity, combat biotic and abiotic stresses, improvement in quality, nutrition, maturity and such other traits-for which we are struggling through conventional crops or animal breeding methods. Minimizing adverse impact of climate change through this science is a major area of research now to attain the rapidity by which we are to overcome those likely issues. In the Assam context, the population pressure on agriculture can be gauzed simply by the fact that in the last five decades (1961-2011) the population in India grew by 170% while the figure is 190% in case of Assam. A look in the rice productivity reveals that it was only 0.86 MT/ha in 1961 (much above the national average of 0.74 MT/ha) has reached only 1.9 MT/ha- whereas national average is 2 MT/ha. This is a unhealthy trend and biotechnological intervention has become imperative for us. With this overall- background and importance of attaining food security by offering latest tools in science to the resource poor farmers, the architect of future agriculture, it is proposed to pursue biodiversity as a major area of intervention in our farming system with following policies-

1. Keeping aside apprehensions existing about ill effects of some biotechnological interventions like GMO, Assam will go ahead to explore all means of biotechnological research to ensure that food products derived from environment friendly production technology which conserve, rather enhance the natural resources base of crops, animal husbandry, poultry and fisheries. In fact, judicious use of biotechnology will be policy of Assam.
2. All efforts will be made to re-invigorate the national priorities like soil health, input use efficiency, income generation, save grain campaign, balancing economy and ecology sustainable agriculture through wide options available in the sphere of biotechnology.
3. Strengthening biotechnology research –preferably applied research and education will be prioritized associating the state with Govt. of India. Initiative and expanding needed facilitate and infrastructure –will be the state policy back up.
4. The AAU and other research organizations will be encouraged to go for all molecular technologies –that has an ultimate bearing on our new generation farmers to maximize production in a sustainable way.
5. Genetic resources from germplasm of Assam may be explored for their traits and strengthened farther aiming our own assets to be more competitive.
6. All efforts will be made to restore soil health, status of flora and fauna, from over exploitation for commercial gain by biotechnological intervention.
7. Periodical interaction amongst research, DOA, GOI and other stake holders will be arranged to-
    a. Fix research priorities (research need analysis for all stake holders)
    b. Review progress of research/past experience
    c. Know deliverables for the farmers
    d. Initiate new policies or reform the existing one whenever needed
    e. Look at global developments in biotechnology sector
8. Biotechnology is a capital intensive sector. In Karnataka, biotech companies, many of whom are dealing in agricultural areas, are coming up in large numbers. It has to be studied the factors behind such progress to explore in our situation.

Policies on Climate change

The status and issues-

According to Assam State Action Plan on climate change (2015-16) published by Environment and Forest Department-

"Observations indicate that since last 60 years (1951-2010), the annual mean temperature in Assam has increased by 0.59 degree centigrade and the annual rainfall has decreased by 2.96 mm per year. Climate change projections for Assam indicates that mean average temperature is likely to rise by +1.7-2.2 degree per cent by mid century with respect to 1972-2000.There is likely to be increase in extreme rainfall events by +5 to 38 per cent. All across the states, except in southern districts, draught weeks are going to rise as well, by more than 75 per cent with respect to the base line (1971-2000). As regards flood, projections indicate increase a rise in events by more that 25 per cent". These observations indicate that unpredictability of monsoon behavior as a consequence of climate change is going to be an issue in the days to come and the agriculture sector needs preparedness in a foresighted way. This being a global issue, we are to imbibe strategic ideas from advance research in this direction and simultaneously the ICAR system and AAU in particular will be path finder for the farming community to minimize the impact on our production system. With such outlook it is proposed to adopt following policies-

1. All efforts will be made to analyze changes in climate behavior by generating data as precisely as possible from whatever agencies may be and document it to base our strategies.
2. The AAU with its expertise, access to information, and experience will chalk out short term and long term strategies to be adopted in our situation primarily to safe guard our farmers and suggest the department on action to be taken. The required policy and financial backup to move in this direction will be provided
3. The network of meteorological observations to be strengthened for whether related information as well as linking such information to population dynamics of the pathogen and insect pest and so on.
4. A full proof system will be necessary for accurate forecasting system on likely incidence of flood, drought, incidence of pest and diseases and other stress factors that may arise- and make such information available to department of agriculture who in turn adopt wide publicity through press, electronic media and direct awareness programme.
5. It will be explored whether a disaster management unit exclusively for agriculture sector to meet any likely emergent situation like epidemic, disease, pest attack, scarcity of water, erosion etc should be created.

6. Massive orientation and skill development of field level functionaries on strategies to combat impact of climate change will be initiated aiming to minimize the gap amongst science, policy and practice.
7. The AAU with its strength on research and technology generation, will take up their own agenda in this direction besides incorporating issues like management of cropping system (e.g. such as varieties with different thermal requirement, varieties with less variable yield, induction of diverse cultivars, change in agronomic practices like sowing/planting time, change in input management, conservation of soil moisture and water efficiency (or like) etc.
8. The Govt. shall encourage and facilitate relevant agencies to work on long term adaptation strategies to overcome adversity caused by climate change through major structural system changes such as –
    i. Changes in land allocation to optimize or stabilize production (E.g. substituting crops with high year to year variation in productivity with crops with stable yields)
    ii. Development of designer- cultivars to adopt to climate change stresses (heat, water, pest & diseases etc.) more rapidly than possible today
    iii. Crop substitution to conserve soil moisture (e.g. sorghum is more adopted to hot and dry conditions than Maize) Wheat may also behave like Sorghum
    iv. Micro climate modification to improve water use efficiency in agriculture (e.g. wind breaks, intercropping, multicropping techniques)
    v. Changes in nutrient management to reflect in terms of growth and yield of crops and also changes in the turnover of nutrients in soils, including losses
    vi. Changes in farming system to maintain farms viability and remain competitive (e.g. conversion of specialized farms to mixed farms that are less sensitive to changes in the environment)
9. The Govt. shall vigorously promote the schemes meant for provisioning health and support to the farmers in the event of loss of crops and livestock due to vagaries of weather (say Fasal Bima Yojna etc).
10. The University will scale up its research on finding gene-based technology capsules for ushering in climate neutral agricultural model-covering crop-animal and other allied sectors.
11. The Govt. will explore for periodical interactions and review (updating and fine tuning) of policies to be adopted to combat impact of climate change associating all sectors concerned with climate change particularly agriculture and allied sectors, Forestry, meteorology, Ground Water, Pollution Control Board, research

organizations, central advisory organizations, ministries etc. aiming to update information and fine-tuning agricultural policy accordingly.

12. In order to monitor every aspect of, and impact of climatic change in agricultural sector and suggest ways forward, a technical cell on climate change should be in position associating all stake holders and experts.

Policies on retaining youths in Agriculture

New generation farmers are not interested in agriculture and it is projected that above 40% of them are ready to quite agriculture. This behavior is the consequence and outcome of social and economic factors. Socially, the new generation farmers are concerned about their dignity- being most of them are literate, educated and facing a competitive world in the post -education life-where their companions move to somewhat dignified status. Usually people, the consumer world looks at farming as downtrodden enterprise-judging on their economic status, lifestyle, backbreaking labour-on which they survive. Economically there is absence of protective market-leaving them as vulnerable to price shocks, vagaries of nature that makes them debt ridden. Lack of pension support or comprehensive health insurance, in accessibility- to proper education for their children, in capability to support them for higher education etc. and all combined together, agriculture is becoming more and more burdensome for them. In addition, absentee land ownership leads to remote control agriculture- limiting all enthusiasm amongst farmers who cultivate in such lands of others. Moreover, gap in adoption of mechanized farming and other frontier production technologies gives a very groomy look on net income per unit area and valuable time that they spent with their best effort. Now considering all these issues, and to overcome this unhealthy situation a series policies are proposed to be adopted as hereunder-

1. Farmers -without whom it becomes a question of survival for us, the consumer world, should be respected, given due dignity and change our behavior towards them and the process should start from school level onwards-where the faculty should project farmers as savior of the world. A change in mindset at this level would give mileage in later stages in this direction.
2. In each farmers' day or national events, farmers should be associated, awards should be given to performing farmers, documentation and projection of success stories in each district ceremony like they do in case of teachers, social workers etc.
3. In this computer age, mechanization of agriculture, adoption of high-tech agriculture, innovative agri-business and marketing intervention modules, diversification towards multicomponent income, insurance coverage, health

insurance, value addition, convergence with ongoing schemes of other departments like health, education etc. and all such ideas can contribute in their confidence building in this vital sector.

4. Absence of protective market in prevailing system to be looked into.
5. Engagement of dynamic farmers/farm women as 'green soldiers' for advisory roles on farm practices will assist the extension network as service providers. This will give a status to the group of young energetic, enthusiastic new generation farmers. A green jersey, a support for their mobility and some financial assistance may have to be provided to 'green soldiers' to bring vibrancy in the whole system. Farmers' acceptance of new technology will be high with their association. Needless to say that they are to be trained and skilled adequately before they go for performing their duty.
6. Proper exposure of farmers and farm women to sites of success stories will also help in confidence building and develop professionalism
7. The Govt. shall promote secondary agriculture i.e. input back stopping (through seed/fertilizer/implements/agri-advise, agri-clinic etc) and output handling (grading, sorting, packaging, branding, storage and marketing etc) involving youths of the State.
8. Reservation of seats in professional courses for students from farming community will also be explored.
9. Attractive projection of success stories, innovative practices, new discoveries in agricultural sector etc by KVKs in a periodic manner will encourage new generation farmers/farm women towards their confidence building in farming sector.

Policies on Intellectual Property Rights (IPR)

The agreement on trade related aspects of intellectual property rights forming an integrate part of the agreement establishing the World Trade Organization set out compulsory uniform standards of intellectual property protection throughout the world i.e. patents, copy rights etc. As a signatory to the Trade Related Intellectual Property Rights (TRIPS), agreement under the World Trade Organization (WTO) regime it was mandatory for the Govt. of India to enact law to provide for the protection of plant verities' either by patents or by *sui generis* system or by combination or both.

Three rights namely Breeders' Right, Farmers' Rights and Researchers' Right can be claimed under PPV & FR Act. New varieties, extant varieties, (notified under section of seed act-1966), and farmers' varieties can be registered under the act. State Agricultural

Departments, Assam Agricultural University, Krishi Vigyan Kendra, State Biodiversity Board and Biodiversity Management Committee may help the farmers for filing for registration

In this era of guaranteeing and protecting the rights of bio-resources and processes emanating from research trials on them. it will be highly essential particularly for state like Assam which contains enviable bio-resources, to protect the entity of its resources through patenting, trademark or copy rights as the case may be. The state shall therefore create a vibrant and accessible IPR Cell, preferably under the university providing additional manpower for this purpose so that all processes for patenting is neatly carried out by the cell, irrespective of who the patent claimer is.

Policies on ICT

The status and issues-

Application of Information and Communication Technology (ICT) in agriculture in Assam is still in nascent stage. As knowledge deficits constrains agricultural productivity ICT can play very important role in the entire process of knowledge (on technology) dissemination at farmers' level. Besides, it can increase efficiency of service providers i.e. agricultural extension management. Aiming association of ICT in agriculture sector following policies will be adopted-

1. All offices of DOA, from directorate to district level will be encouraged to go for paperless transaction in phased manner with adequate training so that every activity can be made on time. This will have a tremendous positive impact on working efficiency in a transparent way.
2. It will be explored whether a 'Farmers' Profile of Assam' can be developed for each district through ICT and computerized documentation of the same to move towards precision farming based on resources at the disposal of farmers of each village. It will also facilitate to obtain hassle free loan from banks besides other advantages.
3. ICT can generate real time data to facilitate the planning process and subsequent extension and monitoring. So, it will be a system of agricultural planning.
4. Need based ICT training at all levels particularly for new generation farmers, farm women including grass root level service providers will be initiated.
5. Securing instant market information through ICT tools to benefit disposal of farmers' produce at appropriate time will also be explored
6. ICT for weather forecasting, early warning on incidence of pest and diseases etc. will be explored

7. ICT will be instrumental to associate farming community to move towards digital Assam in the line of digital India in various ways like access to market information, various govt. initiatives for farming community which may be in the form of Short Message Service (SMS) etc.

Overall Policy on administration, implementation, monitoring and evaluation, documentation, research, innovation and feedback

To minimize gaps in all stages of implementation of various schemes and improvement in service delivery system, following overall policies will be adopted-

1. It will be policy of the Govt. to adopt a Farmers First policy in all initiatives
2. The administrative machinery will be strengthened by filling up all vacant posts immediately of all the directorates and also by creating new posts in the module of T&V programme adopted earlier.
3. Contribution of farmers to the society needs due recognition - formally. So, I-Cards will be issued to eligible farmer/farm women –which will bring a sense of status and help in confidence building to their profession. This unique identity will be linked to a data base of all farmers which will be the base in future planning at grass root level.
4. Complete transparency and accountability will be imposed at all level vigorously and constant efforts will be made to go paperless aiming digital Assam. Agriculture department including all allied sectors will be expected to be pioneer in this aspect.
5. A high power technical committee for both the departments of agriculture and horticulture will be constituted with experts of agronomy, horticulture, entomology, pathology, agri-engineering, representatives of Directorate of Research of AAU headed by Director of Agriculture in case of Agriculture Department and headed by Director of Horticulture and FP in case of Horticulture Department. It will be mandatory to obtain approval of this committee on all technical issues before taking up or implementation of any scheme.
6. Within three months of acceptance of this policy document each sector of agriculture e.i agriculture, horticulture, animal husbandry & veterinary and fishery will come out with a vision document for next ten years encompassing all associated issues and their game plan to go ahead for entering into external and export market- as far as possible on organic footing
7. Considering the importance of avoiding any sort of dilution in implementation of programmes and schemes, **a third party monitoring and evaluation system** will be adopted to strengthen service delivery at farmers' level.

8. At end of each year, **a year book** will be published by each department projecting yearly progress, interim experience, fine tuning needed, farmers' acceptance level of new technologies and target for next year-in a brief and precise manner. The modalities may be structured uniformly for all departments. Documentation of success stories will be a part of it.
9. AAU will also carry out a similar exercise for yearly projection of their achievement in research, technologies ready for farmers and technologies in the pipeline aimed to deliver in coming years i.e. research agenda etc. They may explore for off campus research of success stories elsewhere in the country or abroad to replicate in our situation on the basis of feasibility in toto or after refinement. A regular system to take up demand driven research also for farmers and agripreneurs may be taken up.
10. It will be explored whether a tripartite regular interaction can be arranged between proposed **Farmers Commission**, research and SITA (State Innovation and Transformation Ayog) to develop a precise Actions Ahead Agenda (AAA) for the forthcoming year to bring about required vibrancy in agriculture sector
11. Encouraging private sector participation in agriculture as they can play a major role in post harvest handling, marketing besides forging contract farming with farmers primarily for high value crops/animal produces.
12. Proactive measures will be taken to reduce vulnerability to climate changes. Based on computer simulation models, alternative land and water use strategies will be explored for each agro-climatic zone.
13. Precision farming module- will be a focus area wherever and whenever applicable to strengthen farm economy.

Policies on Animal husbandry

As revealed by economic Survey of Assam 2016-17, the production of milk, egg, and meat could fulfill only 36 percent, 8 percent and 13 percent of the total requirement of the State respectively. Thus it is largely a consumer state for animal products. There is ample scope to be self sufficient in this regard but several constraints are the factors behind this sluggish growth of this vital sector. Weak service delivery machinery, poor genetic merit of most of the indigenous livestock germ plasm, inadequate coverage of genetic improvement programme, shortage of feeds and fodder, inadequate health coverage, unorganized handling and marketing, lack of quality assurance of livestock produce, lack of credit support to farmers etc. are the factors behind this status- which needs to be addressed on top most priority and accordingly following policies will be adopted-

1. Infrastructure and human resource development policy-

In order to provide round the clock animal husbandry and veterinary services in all the 26000(approx.) villages of the state, massive revamping of the infrastructures under Animal Husbandry Department as well recruitment of veterinary officers and support staff commensurate with requirements will be necessary. One of the major policy approaches will be repair and up-gradation of existing infrastructure, creation of new infrastructure, expeditious filling up of all vacant positions of officers and staff and creation of posts commensurate with requirements in the Animal Husbandry & Veterinary Department.

The two existing veterinary colleges under Assam Agricultural University shall be supported with all required facilities for the production of quality human resource for the sector. Additionally, refreshers courses for the field veterinarians shall be made mandatory after every 5 years so that they are trained on changing approaches to the profession. Similarly, in order to meet the shortfall of para-vets, government shall support establishing an institute under Assam Agricultural University for production of Veterinary Field Assistant and stockman with one year training duration with 100 intake capacity.

2. Quality animal seed production policy

One of the vital and very basic requirements to augment production and productivity of livestock is quality seeds produced from elite parent stock. It has been gathered that non-replacement of the existing stock with quality animal seed is eluding the effort to realize optimum productivity and therefore, the shortfall in all animal products. The following, therefore is planned to be pursued:

A. Quality Cattle Seed: The government shall either improve or newly establish one quality semen production farm in each agro-climatic zone of the state with a production capacity of 2.50 lakh semen doses in each. Same principle for buffaloes with a lowered number of two centres nearby the buffalo dominated areas. Principally, semen from Murrah buffalo will be produced.

B. Quality Pig Seed: This has already been taken up partially by ICAR through the Veterinary College and the NRC on pig. However, going by the requirement of quality pig seed, the number being produced by them is far less and therefore, the state government shall take steps to scale it up to 6 more seed production centres utilizing the existing pig farms under the department with little modification wherever needed. The target shall be to produce a minimum of 5000 quality piglets per annum.

C. Quality Goat and Sheep Seed: Goat, the poor man's cow, has the potential to alleviate rural poverty being a part of the rural households. Efficacy and acceptance of AI technology in goat by the farmers indicate that quality goat semen production aspect needs expansion and spread. The state government shall therefore, attempt to produce the semen of goat particularly from Beetal and Sirohi breeds in their goat farm units spread across the state. While the department will improve the stations for this job to be done, the University shall train the veterinary department personals on this. Such technology for sheep shall also be developed and popularized.

D. Quality Poultry Seed: The policy shall be to promote indigenously produced poultry breeds seed production for small holder farmers and accordingly, the department shall take necessary steps to establish poultry hatchery units in each block of the state initially for 5 years after which small hatchery units shall be extended to village level. The breed of choice shall be Kamrupa. For the commercial and semi-commercial farms, the University may enter into negotiation with large poultry farm houses like Venkateswara Hatchery to access grand parent stock from them for the purpose of producing the seed of the desired variety locally. One such seed production farm for the state shall suffice as of now. PPP mode of operation shall also be tried. Similar will be the approach for duck seed production for small and medium holders.

3. Policy for animal feed and nutritional security

Like human being and the crop fields, animals also need their feed and nutritional security for expected level of production. Presently, this is a neglected sector and needs due attention and policy coverage accordingly the following policy:

A. Utilization of VGR lands for fodder production: All VGR lands, mostly lying unutilized for the purpose meant, shall be brought under seasonal and perennial fodder cultivation seeds for which shall be arranged by the University. For seasonal fodder, the identified fodder for an area shall be fitted into the cropping sequence by the agriculture department while the perennial fodder growing shall be the responsibility of the veterinary department.

B. Linkage development with agriculture and KVKs: The other feed needs like maize, wheat bran, rice bran, MOC, fish meal etc. the veterinary department shall enter into an MoU with agriculture department and the KVKs for a buy back arrangement of the produce of the above crops pursued by them. For the production of the above crops, a mission mode program shall be launched by the agriculture department and the University since the products of the above crops are essentially needed to bring down livestock production cost. Since the state is poised to embrace organic mode of agriculture, all the feed to be

compounded with the above ingredients need to be bio-fortified so as to avoid use of antibiotic etc. the residue of which is otherwise an issue.

C. Silage: Since lean season feeding of livestock has always remained an issue, a comprehensive strategic action plan to address the problem is the need of the hour. The Agricultural University, through its Veterinary College, need to validate recent silage making techniques and technologies to identify the best suited one for the state. Tunnel silaging, silaging in silo pits, use of silo bins, geo-technology, mulching technology etc. be tried so that the feed biomass likely to be available from the above two interventions could be effectively preserved and conserved for lean season feeding finding and/ or evolving/ innovating perfection to counter issues like negative impact of high rainfall, high humidity etc. on the silage feed staff.

D. Searching Novel Feed Staff: Since the state is rich in floral bio-diversity, a systematic research effort shall be made to unearth potential but hidden animal feed resources for their inclusion in animal feeding program to cut down cost and ensure ready availability. Research results available with the University through its PhD researchers on the subject shall be screened and the most potential fodder trees, herbs, shrubs etc identified for large scale multiplication on the boundaries of VGR lands for which necessary financial resource shall be provided to the University. Similarly, the activities under the All India Co-Ordinated Projects like AICRP -Maize, AICRP-Forage Crops, AICRP-Tuber crops etc. will have to be spread to wider areas for enhanced production of these crops to support the feed sector. The 23 KVKs in the state shall cover larger areas under their FLD programs on Maize, Ground nut, Soybean, Mustard etc. for the same purpose of enhanced feed resource availability.

E. Sourcing Advanced Technologies on Animal feeding: Right from cellulose degrading bacteria/ fungi to ensuring nutrient bio-availability technologies in the feed staff are available today. These technologies shall be fine tuned for Assam condition for fortifying the rations accordingly.

F. Ensuring Nutritional Security: Each state of the country including Assam has mapped its mineral resources and prepared Area Specific Mineral Mixture that contains the deficient minerals in the soil. Research has already proven that such mixture can, besides ensuring efficient feed conversion, address infertility and related problems. Large scale production of Assam specific Mineral mixture, either by the department or private agencies and its inclusion in animal feeding program shall be mandatory to reap a better harvest of animal protein. The policy shall also be to assess and reassess the soil minerals every three years or

obtain this report from the soil health assessing agencies in the state for effecting changes in mineral dosing, if needed.

G. Compound Feed Manufacturing Units: As of now, the state has only one big player in supply of compound feed of limited quantity. With the increased emphasis on a shift towards semi-commercial to commercial venture in animal farming, requirement of compound feed is likely to increase and therefore, the state shall take effective steps to promote compound feed manufacturing small scale industry in a PPP mode. With the proposed steps under 1 and 2 above, raw materials to support such units are also going to be available. Steps at government farms shall also be taken to store such feed so as to avoid losses etc due to infection and other causes for which needed support shall be explored by the government.

H. Water as Feed Input: Livestock use a substantial amount of water not only for drinking purpose but also for cleaning and washing but till date Animal Husbandry department is not seen taking any step to preserve and conserve water. The department shall therefore make all out effort to create water harvesting infrastructure within the premises of livestock / poultry farms for which the government shall extend needed assistance through schemes like MNREGA.

I. Broad Umbrella Approach: The state government, in consultation with the University, shall frame State 'Animal Feed Security Mission' in the line of National Rural Health Mission or National Food Security mission encompassing all the areas indicated above to ensure animal feed and nutrition security to livestock and poultry.

4. Policy for animal health management and disease control

Management of the health of the animal, like soil and human health, as well as gearing up of the machinery (Man power in the sector and equipments) with skills and competitiveness to control the disease is both very crucial and vital for any animal production program. This aspect is better handled with sub-sectoral approach – one for those diseases that are transmitted from animal to human (zoonotic) and the other affecting animals and birds only. The policy framework for these is:

A. Policy for effective disease surveillance and Monitoring: Since the state of Assam has both domestic and international boundaries, it is highly essential that a close vigil is kept for any kind of disease migration to the state. For trans-boundary animal diseases, molecular surveillance of animal diseases shall be carried out from time to time in collaboration with the national ICAR institute established specially for this purpose. As preventing the entry of

animal diseases into the country through Assam or North East corridor is in the interest of the country, the University shall explore framing of surveillance project in consortium mode involving multi-partners from across the country and also mobilize needed resources and the state shall support to the extent of bridging the resource need gap.

Similarly, a data base on district wise animal disease pattern shall be developed with primary information (based on both active and passive data) collected from the laboratories, Veteterinary Dispensaries/ sub centers etc. for contingency planning for both prevention and on time service delivery. This data shall be updated regularly which will act as the online repository of all available updated epidemiological information of scheduled diseases indicating location, intensity and time of occurrence of different diseases.

B. Strengthened Facilities: Presently, the state or for that matter, the entire region does not have adequate facility to handle highly pathogenic animal diseases like Avian Influenza or PRRS which are a major threat to both animal and man. Though the Veterinary Biological at Khanapara has been strengthened to some extent, it is yet to come up to the level of providing prompt diagnosis. This facility needs to be transferred to the University for effective utilization and desired services to the mankind by further scaling the facility up with BSL-IV level laboratory. The government shall provide additional man power positions needed for such works.

C. Scaled up Animal Health Services Sector: With the kind of animal population the state has, the number of veterinary doctors is too less. The situation is further aggravated from near non-functioning of para-vet production institutions in the state. The department shall therefore carry out a man power need assessment taking the number of vets/1000 heads of cattle/ buffalo, per 1000 heads of pig, per 500 heads of goats and per lakh of poultry and accordingly identify the man power requirement to deliver effective health services. Similar should be the assessment for the para -vets and minor animal health service providers. The veterinary hospitals/ dispensaries shall also be fully equipped for offering faster diagnosis and treatment. A schedule for vaccination of the animals shall also be worked out and followed to guarantee proper protection from infectious diseases. The Colleges shall be updated to validate and also develop molecular animal disease diagnosis kits for onward transmission to the dispensaries/ hospitals after properly training the field veterinarians on their use. One mobile ambulatory clinic equipped with all facilities shall be provided to each district of the state initially which might be taken to block level later on.

D. Empowering Unemployed youths on animal health service delivery: Groups of Prani Mitras shall be constituted village wise drawing the unemployed para-vets prepared by the proposed institution for knowledge and skilled backed animal health services at the door step by these groups.

E. Promoting Veterinary Service Concept in the line of Agri-Clinics: Agri-Clinics established by professional agriculturists have worked very well in some states in providing crop protection and treatment measures. A similar approach for the animals in the form of Veterinary. Service units to be managed by unemployed veterinarians shall be attempted through SFAC particularly for companion/ pet animals. Such services could also be utilized for inspecting the animal product selling booths/ shops to check transmission of animal food borne diseases if the department personals find it difficult to attend. Such service providers shall have to be certified groups by the department.

F. Working for 'One World One Health' Concept: With the world becoming a global village due to increased mobility of people and NET connectivity as well for agricultural trade liberalization, steps shall be taken to work towards the UNO's above concept. For this, collaborative/ consortium mode of disease projects will be worked upon involving the vets, medical professionals, food processors, people from alternative medicines as well as social scientists. Escalated research shall also be carried out on CAM (Contemporary Alternative Medicines), development of bio-formulations using the bio-resources of the state/ region and bio-prospecting of disease countering genes in domestic and wild relatives of plants and animals to find out chemotherapy free health management options.

G. Carcass Care and proper disposal of dead animals: The Municipality Board shall be given a specific task to ensure timely removal and burial of dead animals to check the risk of disease pathogen spread in the area. Wherever needed, the department staff shall assist them to carry out this job. Similarly, advanced knowledge and technology shall be applied for adequate disposal and use of animal wastes – be it carcass, dung or urine.

5. Policy for conservation and utilization of animal genetic resources

Food and Agriculture Organization (FAO), Rome, Italy has already accepted that each country of the world has sovereign rights over their animal genetic resources and India is also a signatory to this. It is therefore important that the state work towards this direction and conserve and preserve its unique animal and poultry genetic resources for utilization of their hidden traits in future breeding and developmental program. Compounded with this requirement is the currently unfolded characters in the indigenous animal genetic resources like the possible use of urine, milk etc from indigenous cattle and buffaloes for therapeutic and other purposes. The state shall therefore identify at least 100 hectare area in each of the 6 agro-climatic zones for conservation of its animal genetic resources. The department shall explore funding support from Govt. of India, Department of animal Husbandry, Dairying and Fisheries besides the support under schemes like RKVY. Exploration of stress

countering genes/ traits from them shall be taken as researchable issues. Pastoralists shall also be taken into this genetic resource conservation fold.

6. Breeding policy for livestock and poultry

It has been gathered that breeding policies for many animals are not available and that even where they are available like cattle and buffalo, they have not actually been worked upon. For any improvement to bring in the livestock and poultry, a sound breeding policy and adherence to it is almost mandatory. The state shall therefore, have a total relook at the framed breeding policy and also prepare the policies for those animals for which it is presently not available. This task shall be completed within 6 months.

7. Policy on dairy sector

Dairy sector growth in the state has not been commensurating with the population growth with resultant milk deficiency to the extent of more than 50 per cent. The use of Jersey and Holstein breeds of cattle without a suitable replacement policy needs to be reviewed more particularly due to the current research finding concerning A1 and A2 milk alleles. The breed of choice for improving the genetic merit of indigenous cattle shall be indicated by the breeding policy framing group which will then be accepted for the state after thorough discussion and debate.

After the breeds are decided, the production part will be linked to the policies indicated under seed, fodder and health coverage for realizing optimum benefit and bridging the gap in milk availability. Since government sector or university alone cannot do this job, the policy shall be to rope in cooperative sector, the NDDB, the programs of Govt. of India on Bull Mother farm creation etc. Yet another aspect will be to encourage private service providers particularly in providing adequate input backstopping in the form of semen, value addition to milk and milk products, the animal fertilizers like area specific mineral mixtures and disease diagnostic kits etc.

As of now there are few functional cooperatives who are also constrained with hindrances. The government, under the chairmanship of Additional Chief Secretary (Vety) shall arrange to take a complete stock of the functioning of these cooperatives and facilitate redressal of their problems so that they can emerge as a viable alternative to push the milk sector growth curve forward. In addition, the state has a large number of individual and innovative dairy farmers who can outperform their present level of performances if government lends the supporting hand. Such farmers need to be enlisted as progressive dairy farmers through the respective DVOs/ public representative/ panchayats and

necessary support service provided right from scaling up his/ her farm to procurement of the produce to partnering him / her in government sponsored programs.

It has been seen that the crop farmers of the state receive many benefits right from improved seeds to fertilizers which is eluding the dairy farmers. Therefore, inputs like area specific mineral mixture, milking machines, fodder seeds etc shall be arranged by the department in a subsidized manner to the dairy farmers. The activities under dairying shall also be attempted to be made tax free. Similarly, MSP for milk shall be implemented based on actual cost of milk production and this responsibility of working out the cost shall be given to the Agro-Economic Research Centre of GoI which is functioning under the University. The university and the department shall validate, develop and provide milk quality testing kits/ adulterant detection kits at affordable cost. Dairy animals shall also mandatorily receive the benefit of insurance coverage.

In view of the climate change impact, special housing design shall be developed by the university, carry out studies on Heat Shock Proteins, calculate the THI requirement of the animals and also prepare contingency planning to deal with the issue.

Credit facility provision for purchase of good quality animals, construction of sheds, machineries like tractor/ power tiller for fodder plots, milk cooling chamber etc shall be considered by the financing agencies dealing with agriculture sector. Issuance of KCC to the animal farmers shall be considered for easy access to farm loan. No distinction shall be made between dairy and crop sector while extending the credit facility.

8. Policy for strengthening organized milk marketing channel

In order to minimize the role of middle man in an unorganized milk marketing environment, one of the important policy thrust would be to create more and more Dairy Cooperative Societies. This would be the bottom level platform for providing veterinary and animal husbandry services to the bulk of the poor rural cattle owners and also for collection and marketing of milk with the active involvement of Animal husbandry & veterinary department and the Dairy development department. The aim would be to promote small holder dairy activity at the poor rural household level by providing access to scientific means of production and support system. The Department of Dairy Development, the Department of Animal Husbandry and Veterinary, the Panchayati Raj institutions, financial institutions, NGOs and SHGs would be brought under a nodal agency for bringing out a kind of dairy cooperative movement.

In order to promote dairying in Assam, the micro-, small and medium-sized enterprises relating to dairy business will be supported. Dairy farmers shall be given subsidy by

Government for attracting the new generation to dairy sector in the form of cattle feed subsidy to the tune of 20 %, quality animal purchase subsidy and housing infrastructure subsidy to the tune of 50 per cent.

9. Policy for milk revolution

Since milk is an essential item for ensuring nutritional security, particularly among the children, lactating mother and the old age population, a blue print for a Blue Revolution in the state is necessary. It is disheartening that the state does not even produce 1 million tonne of milk of the 142 million tons produced by the country. In order to give a boost to the sector, the state shall completely modernize its existing cattle farms in terms of infrastructure, animals, and equipments needed for automation and clean milk production besides complete strengthening of the co-operative sector including procurement and subsequent processing of milk in to value added products. The enhanced capacities shall be supported, from production to marketing under the policies outlined above already.

10. Meat production and marketing policy

The state has the opportunities to transform its meat sector both for domestic consumption as well for meeting export demand of neighboring countries for which the following policy coverage has been designed ;

For export purpose:

Assam has a sizable population of Swamp buffaloes which are used for agricultural purposes. Unlike the other parts of the country, no river-type buffaloes are found in Assam. Swamp buffaloes are poor in milk production but excellent source of meat. There is tremendous scope for utilization of Swamp buffaloes for meat production for export market. Unfortunately till now, no scientific approach has been made to exploit these native animals for meat purpose. The swamp buffalo farmers shall therefore, be supported to establish fattening farms, at least 6 numbers in the state, to prepare the buffaloes for meat purpose either in live form or in processed form depending on the demand particularly in countries like Bangladesh. A scientific schedule shall be prepared by the department for the buffalo growers to follow and capture this market. Similar fattening units could also be prepared for spent cows and bulls as there exist a clandestine cattle trade with Bangladesh. This will legalize the export and help in earning foreign exchange. Fund required for this shall be explored either from NEC or Ministry of DoNER.

For domestic purpose:

The meat sources for the state are from pig, goat, sheep and the poultry including duck, quail, turkey etc. which provide only around 42500 Kg of meat with a per capita availability 1.90 Kg against All India average of 5.5 Kg and ICMR recommendation of 10.65 Kg. Now, in order to take this availability to All India level at least, a production increase of 3.60 Kg (5.50 - 1.90) per person will have to be targeted. Considering a non - vegetarian population of 2.50 crore in the state, the meat production will have to be scaled up to 9.0 crore Kg. or 900 lakh Kg. out of which around 100 lakh Kg. could be met from the sale of spent hens after egg laying. A policy for the production of remaining 800 lakh Kg. is therefore needed. A reasonable policy to produce 800 lakh Kg. of meat will be to target 20 percent production from pig, 40 percent from poultry and 40 percent from goat i.e 160, 320 and 320 lakh Kg. respectively.

160 lakh kg from pig: if we target a carcass weight of 55 Kg per pig, the state will need around 2.91 lakh numbers of pigs to produce 160 lakh Kg of pork. A Mission Mode project shall be framed to produce this number, both under public and private sector, where around 10 lakh farmers are engaged rearing one or two pigs and if supported with right type of pigs for rearing backed by technology and other deliverables, the state can achieve this miracle looking target. The sector is very much paying. Considering a net profit of Rs. 25/ per Kg of pork, the profit from 160 lakh Kg of pork is going to be as hooping as Rs. 40.00 crore annually.

320 lakh kg from Broiler poultry : Considering an average weight of 1.50 Kg per broiler chicken at marketable age, the state will need around 2.0 crore broilers to produce 320 lakh Kg of poultry meat. For this a strategic approach to scale up and newly establish around 315 farms with a farm unit size of 1000 birds X 6 batches per year, shall be taken.

320 lakh kg from Goat & Sheep : At an average carcass weight of 7 Kg per goat, the state will need 46 lakh goats to produce 320 lakh Kg of goat meat. Since goat is considered a poor man's cow, the policy shall be to encompass the existing goat farmers of the state, besides the state machinery and private players to produce this number in 3 to 5 years with their horizontal expansion to replenish 50 percent population on yearly basis that is likely to be slaughtered.

For the meat sector, the issue of input backstopping has already been indicated. Though the road ahead appears difficult to walk on, primarily due to financial resources and massiveness of the goal, it will be doable through:

- Accessing the needed capital from the non-lapsable pool of fund for NE Region under the disposal of the central government for which the Members of Parliament from the state shall take the needed steps with state's backing.

- Major national and even international players dealing with meat and egg sector business shall also be facilitated to establish 'Make in India' livestock food products centres.
- Tie ups with ICAR institutes like NDRI for dairy, IVRI for health related issues, Poultry institutes like CARI / PDP and pig institute like NRC-Pig will have to be made both for technology sharing and 10 percent funding support of their budget which is earmarked for NE region.
- Since backyard animal farming or Integrated mode of farming is very common in the state, 25 to 30 percent of targeted production shall be realized from them enlisting them as tertiary production units to the main production house.
- With slaughtering etc facilities that are going to be put as a component of the mega program, several livestock product processing units shall be established, right from meat/ bone meal production factory to feather/ skin/hair etc processing.

11. Poultry development policy

The egg sector:

Present availability of egg per person per annum in the state is only around 20 against All India average of 57 and WHO recommendation of 180 eggs. Now, if we take an immediate target of reaching the All India average availability number of 57, the state will have to attempt to add up to its egg basket another 37 (57 - 20) eggs per person. Considering an egg eating population of around 2.9 crore, this increase will mean an additional production of 107 crore eggs annually. Presently, around 30 lakhs eggs are brought to the state from outside every day. Their production locally is therefore an important task. In order to achieve this target, the state will have to establish 1600 number of layer farms with 220 number of egg laying capacity (per bird per annum) bird strength of 3000 in each farm. Out of this number of 1600 farms, 50 percent could be established with central assistance and 50 percent in a PPP mode thereby opening up self employment scope. Together with this, the rural poultry sector, where a sizable population is engaged, shall be improved upon with improved breeds and production packages. A time table of 3 years could be earmarked to reach the number and financial resources planned accordingly. A buy back arrangement of the eggs so produced shall be put in place by establishing Poultry Corporation so that the production units feed the corporation which will operate in a hub and spoke model across the state and the corporation in turn feeds the retailers and consumers. Employment avenues in this sector of product procurement and delivery also could be imagined.

Promoting diversification: The dominant poultry species in Assam is fowl (197.33 lakhs) followed by duck (73.11 lakhs). Unlike many other states of the country, rearing of duck is

traditionally popular and both duck meat and egg are favored over that of fowl meat and egg. Pigeon is another poultry species reared by farmers in rural areas for production of high value delicacy meat from the swabs. Turkey, Guinea fowl, Geese as well as Quails are also reared in limited numbers by farmers in rural areas. All these species shall be promoted as specialty product of the state.

Others:

The policies with regard to animal biotechnology, animal insurance, tax rebate on livestock product, organic animal farming and marketing have been dealt with under agriculture sector.

Policies on Fishery sector

The aquatic resource i.e water spread area available for fishery in Assam that accommodate fresh water fish is estimated at about 5.5 lakh ha and this area annually produces about 2.94 lakh MT of fishes (2015-16).The nutritional demand is about 3.36 lakh MT. The per capita availability of fish is about 9 kg. against a requirement of 11 kg. It is also reported by Economic Survey of Assam (2016-17) that although the resource potential for

fish production is high, scientific fish farming and management is being practices only in a small portion. Assam is bestowed with more than 200 nos. of fish species- mostly having commercial importance. In spite of such inherent strength and lot of schematic intervention so far, this sector is still a hunting ground for external supplier of fishes from other states. A look at the vast potentiality of this sector in the stage will reveal that the state should be not only shelf sufficient but a premier producer and even exporter of fresh, processed and ornamental fishes and a major area for employment and income generation. Besides, new areas in the form of aqua-horticulture, aqua tourism and angling, production of vast range of value added products, aquarium gallery with ornamental fishes, organic aquaculture are emerging. Considering this status and aiming to bring vibrancy in fishery sector, it is proposed to adopt following policies as hereunder-

A committee will be constituted comprising experts of AAU, state department of fisheries, representative of business community associated with fishery sector and performing fish farmers to prepare a master plan for development of fishery sector in Assam with precise goal of self sufficiency as well as to strengthen the state as a premier player in fishery within next five years. The plan should project, existing gaps in the sector and way forward to overcome them, an action plan with road map for each district of Assam, deliverables at the end of the project, financial implications and if any policy decision is needed

- The overall policy objectives will be Make the state self-sufficient in advanced fingerling production and thus the table fish production by 2021.
- Ensure effective conservation and judicious exploration of indigenous fish and fishery resources.
- Generate entrepreneurial and employment opportunities and facilitate creation of necessary infrastructure facilities through public and private investment in the sector.
- Encourage the farmers for adoption of Good Management Practices in fisheries and aquaculture.
- Technologically empower the sector with improved package of practices for enhancing productivity as well as combating emerging challenges like climate, flood etc.

1. Policy for fisheries resource management

- Fishery resources of the state shall be mapped within two years using Remote Sensing and Geographic Information System (GIS) for drawing resource specific intervention plans aimed at improving the production capacity of these resources.

- The Assam Fish Seed Act 2005 shall be the basis for quality fish seed production at the private sector. All fish hatcheries including defunct hatcheries shall be brought under the purview of the above Act..
- Government shall promote Fish Seed Villages for reservation of ample fish seed to be stocked in ponds during post flood period.
- All qualifying hatcheries/fish ponds of fish seed producers/growers/happa breeders/progressive fish farmers shall be registered under Fishery Deptt. Renewal of annual registration shall also be ensured subject to adherence to Assam Fish Seed Act 2005 by the farmers.
- Fish seed certification body shall be formed to check its quality. A fish seed monitoring mechanism, particularly for checking the inflow of inferior seed shall be put in place. All seeds are to be procured from the registered seed producers.
- Department shall encourage Brood Fish Bank Concept and shall convert few important Government farms to the Brood Bank under Government schemes.
- Department shall emphasize on improvement of fish seed transportation system.
- Research shall be scaled up for breeding of commercially important indigenous fish species, research on climate resilient fish culture, formulation of low cost fish feed and development of integrated farming system modules.

2. Policy for aquaculture including pond culture

- At least 30 per cent of MNREGA fund shall be earmarked for additional 1 lakh number of new fish ponds (0.3 to 1.0 ha each) as well as for renovating the existing ones on scientific footing to increase per hectare productivity to 5 tons initially and then to 8 tons.
- Package of practices for culture fisheries shall be updated every two years and fish growers trained on its adoption and application.
- Government owned derelict water bodies and low lying areas unsuitable for agriculture would be reclaimed and leased out to groups of SHGs/cooperative society for enhancing fish production.
- Integrated fish farming with agriculture, horticulture and animal husbandry would be promoted for improving and stabilizing farm productivity and income of rural poor.
- Government shall encourage promotion of cluster-based fisheries development approach in rural pond aquaculture.
- In each of the 6 zones of the state, a demonstration unit shall be established for technology showcasing on advanced breeding and rearing techniques. Such units may be with the Department of Fisheries or the University including its KVKs.
- Govt. of India's (ICAR) recommendation shall be followed before introduction of any exotic fish in state water bodies.

- The College of Fisheries and the Fishery Research Centre under the AAU shall be facilitated to develop organic aquaculture package.
- For prompt and quickest aquaculture extension system, private extension shall be popularized with the involvement of *Matsya Mitra* at GP level, *Matsya Sarathi* at Block level and *Matsya Sanchalak* at district level plus reputed local NGOs for training & capacity building programs.
- Department shall introduce Single Window Project Management Approach through State Project Management Unit (SPMU) at the Directorate. The SPMU shall consist of highly experienced and professionally qualified technical officers supported by Engineers, Accounts and IT professionals. The Unit shall be headed by a Chief Nodal Officer and will be assisted by concerned Nodal Officers.
- Benefit of Fasal Bima Yojana shall be extended to fishery sector and the current taxation rate on fishery inputs and products shall be reviewed and possibly done away with.
- Fisheries hospital in each district shall be established or the district fishery offices strengthened for testing soil and water quality as well as fish health and other services including extension services.
- Suitable facilities including greenhouse facilities for advanced fish breeding for early rearing (Feb/March) shall be created.

3. Policy for fish health management

- A Regional Centre for Fish Disease Diagnosis and Monitoring shall be set up in the college of Fisheries, Raha.
- District level fish disease diagnosis unit linked with the Fish Disease Diagnosis and Monitoring centre shall also be established.
- Creating facilities for developing quarantine and bio-safety protocols in cultured systems to avoid threats of trans-boundary diseases.
- Mobile clinics well equipped with facilities for testing soil and water and fish health shall be promoted.

4. Policy for *beel* fisheries

- The *Beels* of the state are scientifically unexplored water resource of the state. In order to reap the best harvest from these beels, a comprehensive project shall be framed by the University for their Improvement and utilization for productivity enhancement.

- Possibility of community based fisheries management for adoption of pen and cage aquaculture in the beels and other community water bodies will be explored and detailed mechanism shall be worked out.
- Concept of Model Beel as Demonstration Unit in each district, beel ranching and integrated development of beel would be popularized.
- For conservation of indigenous fish germplasm and fish bio-diversity, the concept of Fish Sanctuaries shall be introduced in few select water bodies.
- *Centers of Ecotourism and Aqua Sport* shall be developed in compatibility with the socio-culture and livelihood of the primary stakeholders in and around *beel* premises.
- Effective conservation and judicious fishing norms, for control of over fishing, illegal fishing shall be put in place in the identified *beels* which will be monitored by an officer not below the rank of Fishery Extension Officer.
- Leasing out the beels to the adjoining community shall be considered for better management of the resource.

5.1 Policy for riverine fisheries

- Conservation measures as per Assam Fishery Rules, 1953 shall be enforced to minimize further degradation of riverine ecosystem, balanced retention of the aquatic resources and enhance natural productivity.
- Conservation incentive in the form of award, recognition to the local Community based organization, SHGs, Co-operative societies, NGOs, etc. shall be considered for effectiveness of conservation facilitating declaration of the sites as protected areas, closed season for fishing, preventing /banning the use of destructive types of fishing methods and gears, mesh size regulation etc.
- For enhancing fish production from the riverine resources, fish seed stocking (called as river ranching) with quality fish seeds of suitable varieties shall be ensured.
- In potential locations, purely site specific, community based pen and cage culture shall be encouraged for productivity enhancement.
- The methodologies adopted by states like Andhra Pradesh, Tamil Nadu, Uttar Prdesh, Maharastra, Orisa, Jharkhand, etc for fish production enhancement in reservoirs shall also be followed in the state.

5.2 Policy for reservoir fisheries

- Initially regular stock enhancement program in the reservoirs shall be taken up creating basic fish seed infrastructure like captive hatcheries, rearing pond etc.

- Captive rearing and nurseries shall be established at the vicinity of the reservoirs which shall be leased out to Fishermen Cooperative Societies for rearing of fish seed up to advanced fingerlings of 80-100 mm size under govt. schemes.
- Cage and pen culture shall be promoted in the suitable areas to boost fish production as well as employment generation.
- Conservation measures shall be enforced for catching fish as per Assam Fishery Rules, 1953.
- The policy shall propose to transfer the fishing and management rights of the reservoirs to the Fishery Department for the purpose of fishery development.
- The department shall draw a full proof plan to manage the reservoirs.

5.3 Policy for derelict water bodies

- The state shall take needed steps to reclaim around 20000 ha of derelict water bodies to enhance fish production without disturbing the original ecology of the water bodies.
- In suitable and feasible locations, construction of community tanks and leasing to the fishermen cooperative societies/SHGs, etc. shall be undertaken. Management of such fishery shall also be handed over to the local fishermen cooperative societies/SHGs, etc.
- Community-based fisheries management shall be promoted for development of the derelict water bodies.

6 Policy for ornamental fish

- The policy shall envisage adopting a rational exploitation strategy from natural freshwater resources where indigenous varieties are available.
- Department shall give attention on captive breeding of potential local varieties of ornamental fishes under R&D program of the university and research institutes of the state to ensure development of breeding and larval rearing of those potential local ornamental fish species. This shall directly help to conserve natural resources and fish bio-diversity, as the dependency on nature for ornamental fish collection shall gradually decline.
- Potential entrepreneurs/farmers shall be trained-up on ornamental fish breeding for taking up ornamental fish farming as profit making rural enterprise.
- Government shall give more emphasis on fish breeding and propagation, culture, etc. in selective breeding units to be established under private sector.
- Women SHGs shall be assisted technically and financially to take up ornamental fishery in a big way with the financial assistance from RKVY/NFDB/MPEDA where ever available and applicable.

- Government shall take aquarium keeping in all the government/affiliated University/ College/school (s) for bringing mass awareness on ornamental fisheries and thereby exploring the potential of the sector to create livelihood and employment generation among the unemployed youth and women.
- Government shall initiate the concept of establishment of health certification centers for quarantining at key locations of the State.
- Public Aquarium, Ornamental fish park shall be established as a measure towards eco-tourism through PPP mode in prominent places.
- Promotion of mini hatcheries for seed production of ornamental fish.
- Policy shall emphasis establishment of aquarium gallery cum ornamental fish gene banks at the campus of Directorate of Fisheries to conserve indigenous ornamental fish germplasm.
- Proper export policy with Green certification for indigenous ornamental fish trade.

7 Policy for cold water fisheries

- Government shall arrange detailed study on prospect and potential of cold water fisheries in the State and shall come up with detailed road map for sustainable exploitation of the resource.
- Directorate of Cold Water Fishery Research (DCFR), ICAR, Bhimtal shall be engaged for such studies and based on the out- come of the study selective development initiative shall be taken (in collaboration with the College of Fisheries, AAU, Raha).

8 Policy for fishermen (fishers) cooperative society (societies)

- Creation of awareness about the right and responsibilities of members and democratization of election process. Training and exposure visit to successful Cooperative societies shall be arranged to ensure good governance in fisheries cooperative.
- District Fisheries Development Officer and Fishery Extension Officers shall be empowered to perform the role of Assistant Register, Cooperative Society and Inspector of Cooperative Societies by making suitable amendment to the existing Bylaws and Rules of Cooperative Societies. The entire responsibility for management of fisheries cooperative societies shall be handed over to the Fisheries Deptt. Fishery Officer not below the rank of FEO shall be the Member Secretary in a cooperative society.
- Incentive and award to the best performing societies based on overall production and annual profits and other socio-economic parameters.

- The State shall take appropriate steps to strengthen all the existing Fishery Cooperative Societies by developing need based infrastructures with financial assistance from NCDC/FISCOPFED/ NFDB/RKVY etc. as applicable.
- The policy shall advocate bringing FISHFED under the aegis of Fishery Department so as to organize fish procurement, marketing, processing, in a systematic manner on the lines of other States like West Bengal, Orissa, Andhra Pradesh, etc. This shall create additional employment generation and livelihoods to thousands of fishers as well as streamline the entire fish marketing system in the State.

9 Policy for post-harvest, marketing & value addition

- AFPA shall aim at developing and maintaining a fast and reliable marketing network to reduce post harvest loss, better price for fish seed and table fish producers besides creating gainful employment opportunities.
- FCS/SHGs/FPOs would be motivated to establish a marketing network along with transporters and retailers.
- Construction of whole sale and retail hygienic fish markets, retail outlets, mobile outlets, aqua-shop shall be promoted and consumer's awareness shall be taken up to ensure engagement of rural unemployed through fish marketing.
- Hazard Analysis and Critical Control Point (HACCP) and other quality issues shall be monitored by the Government machinery to ensure quality products to consumers.
- Improved dry fish processing and packaging technologies shall be adopted to enhance marketability.
- AFPA shall emphasize on improvement of marketing facilities for the fishermen by providing deep freezers, insulated vans, live fish carriers, ice plants, etc. as per the government norms.
- Women SHGs would be trained in reputed institutes and financially supported for value addition of fish and their marketing.
- AFPA shall encourage involvement of private sector through PPP mode in creating requisite infrastructure for value addition and smart marketing of fish and fishery products.
- Establishment of quality assurance laboratory at the Directorate or in the Fishery College to check the quality of frozen imported fishes from other states.
- AFPA shall empower the Department of Fisheries in inspecting import/export of fish and fish seed and agency dealing with fish and licensing for all fish and fishery products in all aspects of quality assurance including inspection of fish health in the wholesale, retail markets/outlets. Government through its designated officials (not below the rank of Fishery Extension Officer) would ensure proper inspection of consumable fish in the wholesale,

retail markets/outlets and quality export and import permit for fishery products and endorse export permits for fishery products along with other State and National authority. Sophisticated fish disease diagnostic and quality assurance Lab shall be in place in each district and State Head Quarters.

- Department shall ensure financial assistance for modernization/construction of wholesale and retail fish markets, establishment of cold-chain, value added fish production centers, individual fish retail outlets, model fish dressing centers and dry fish production units, strengthening of post harvest infrastructure, development of fish processing, preservation and storage facilities including ice plants and chilled storages, and fish transport infrastructure including refrigerated trucks/ containers and distribution of subsidized insulated fish boxes.
- The Segmentation, Targeting and Positioning (STP) approach of marketing research should be adopted for more profitability and sustainability of fisheries and aquaculture business. After segmenting the market using different demographic and geographic variables, the target market should be identified through consumer survey. The position of fish to be created in the minds of the target segment has to be identified. To create the identified position, the marketing mix has to be conceptualized.
- Promotional campaign using different mass media to create awareness and popularity of different value added fish and fish products with their nutritional value should be taken in order to increase consumption of fish and value added fish products.
- The promotional actions should be made through (i) television and radio commercials; (ii) press brochures and street posters; (iii) leaflets providing direct or indirect information on the product. Promotion in the main demand areas i.e. product testing, product presentation, cooking presentations should be emphasized.
- Branding strategy for value added fish and fish products should be formulated.
- Fish food festivals with good publicity should be organized where consumers get exposure to variety of fish and value added fish products which be linked to super markets.

10 Policy for fishery and aquaculture extension

- The AFPA envisages to popularize the private extension for a vibrant fishery extension service throughout the State by engaging Matsya Mitra at the GP level, Matsya Sarathi at the Block level and Matsya Sanchalak at the district level.
- Department shall adopt the concept of establishment of Fish Call Centre (to be called as Matsya Sahayak) at the Directorate of Fisheries which can be dialed from all over Assam to facilitate the farmers and other stakeholders to get reliable fisheries and aquaculture information easily. The centre will be manned by Fisheries Department officials.

- Fisheries and Aquaculture success stories from different parts of the World would be documented through the Call Centre-the *Matsya Sahayak* to the farmers.

11 Policy for information, education & communication and awareness

- Effective system shall be introduced for collection, compilation, analysis, storage, dissemination, updating the data base and maximizing the use of Information and Communication Tools (ICT) for fisheries planning, management, monitoring, and governance and evaluation process.
- Need based awareness programs shall be conducted in each and every development block by involving institutes like CIFRI, CIFE, COF, KVKs to educate the farmers and other stakeholders on sustainable fisheries development.
- Information, education and Communication shall be strengthened for improving the knowledge base at the grass root level, and also for taking the issue relating to conservation, management, development of fishery resources and providing food and livelihood security to fishers in the State.
- Strategic linkages among State Agriculture University, Krishi Vigyan Kendra (KVK), CIFE, CIFRI, CIFT would be strengthened and farmer need based extension strategy would be evolved accordingly.
- Capacity development shall be focused at four levels (a) individual fishers including fish farmers, fisherwomen and other stakeholders, (b) State Fisheries Departmental officials, (c) NGOs and Fisheries Cooperatives and (d) unemployed youth and entrepreneurs.
- Maximum emphasis shall be given for capacity building of farmers through progressive farmers as far as possible.
- Department shall undertake development and publication of need based scientific literature in the form of leaflets, bulletins in Assamese, English, Bengali (and in other local languages) for better and greater dissemination of information to ensure sustainable fisheries.

12 Policy for women empowerment (in fisheries sector)

- Training on fish seed raising for employment opportunity.
- Management of aquariums/backyard hatcheries for self employment.
- Making and repairing of craft and gear with the help of cheap and easily available local material for sustainable catching and harvesting,
- Preparation of pen and cages for promotion of pen and cage culture.
- Training on conservation of endangered fish species.

- Preparation of value added fishery products (e.g, indigenous fish drying, smoking, salted, fermented products, fish pickles, etc.).
- Department shall take steps to educate the fisherwomen for micro credit enterprise for their empowerment.
- Department shall encourage formation of *fisherwomen club* at grass root level to make fisherwomen self reliant, self dependent and self decision makers. Such fisherwomen clubs shall be facilitated by providing daily news papers, fisheries bulletin, besides provision of radio and TV at the club premise.
- AFPA shall focus on training and capacity building of the women fishers and fish farmers on relevant subjects.
- Department shall explore the possibilities of undertaking community based women led fisheries project for rural household aquaculture and in ornamental fisheries.

13 Policy for human resource development

- Department shall reform the recruitment policy to recruit requisite number of professional fishery graduates for each development block to accelerate extension and development. Sufficient promotional avenues and appropriate incentives coupled with accountability shall be the integral part of the policy.
- Department shall conduct training on development management program for senior officers, project management program for middle level officers, and technical training for junior staff. A minimum one month probationary training shall be arranged for the newly recruited Fishery Extension Officers/Fishery Demonstrators to make them well accustomed with the Departmental activities.
- Regional Fisheries Training Institute (RFTI), Amranga, Guwahati shall be upgraded to a Regional Institute of Fisheries and Aquaculture Development (RIFAD) with national outlook. The entire training and related skill development program shall be conducted by RIFAD.

- AFPA shall focus on establishment of Fisheries and Aquaculture University, Fishery Colleges and Fisheries Polytechnic through public or private sector to cater to the needs of fisheries professional manpower. (In this case proper assessment of manpower requirement in all the sectors of fisheries and aquaculture is essential)
- The existing training program for Fishery Demonstrators shall be upgraded for two (2) years training program with the inclusion of course content like open water resource management including wetland fisheries management, forest fisheries management, integrated cluster based development, government fish farm management for productivity

enhancement, hatchery operation and maintenance, community based fisheries management, etc. apart from normal course content.

- AFPA shall emphasize on renovation of all the training centers including hostels of Fishery Department and all the local level fishery training shall be conducted/ arranged accordingly.
- Information Communication Technology (ICT) shall be implemented in the Department to act as a cost effective and interactive mechanism for delivering relevant information and knowledge to the stakeholders.

14 Policy for environment code of conduct in fisheries

- The State Fisheries policy shall ensure that Environmental Impact Assessment (EIA) is carried out taking into consideration all large scale/ commercial fisheries sector projects, control/ ban destructive fishing including poisoning, electric shocking and dynamiting and processing activities, monitor and review environmental protection measures applied in fisheries sector, promote protection of the fragile ecosystems, ecosystems process and conserve icthyo-biodiversity by protecting endangered, vulnerable, threatened fish species, habitat as well as areas of specific biological significance.
- The policy would ensure sustainable and rational exploitation of fishery resources by putting in place mechanisms at appropriate level and promote alternative livelihood to fishers during lean fishing seasons.
- The policy also strives to promote public awareness among all stakeholders for the need to protect aquatic ecosystems and fish in particular and promote multi-disciplinary research into adverse environmental impacts on open waters that support fisheries.
- A concrete strategic action plan would be evolved for implementing conservation and protection of the rich biodiversity of the State.
- Department shall identify and designate few areas as protected areas (Fish Sanctuary) to allow natural *in-situ* spawning and breeding of potential fish species and shall conduct vigorous training and awareness camps in those localities. Extension service system shall be strengthened to make people/farmers aware about the destructive effect of culturing undesired, exotic and banned species of fishes.

15 Policy for infrastructure strengthening

- New pond construction including seed production and rearing infrastructure in potential location through cluster based fisheries development approach shall be promoted.
- Establishment of hatcheries at private and govt sector would be ensured.
- Pen and cage culture for fish seed raising in Beels would be promoted.

- All the Government farms which are under lease shall be brought back to the fishery department. Young Fishery Graduate shall be engaged as Farm Manager and their service performance would be linked with field performance.
- Establishment of small and medium size feed mill shall be encouraged.
- *Eco-tourism and Aqua Sport* shall also be considered which shall create new avenues in wetland fisheries.
- Net making, boat making and other related activities, etc shall be introduced as alternative livelihood activities during closed season in *Beel*.
- Need based requirement of fish seed hatcheries shall be established especially for progressive fish farmers, successful cooperative societies, etc.
- AFPA shall focus on establishment of need based infrastructure for hygienic fish markets in the form of hygienic wholesale and retail markets, mobile fish retail units, road side rural markets or other related infrastructure.
- AFPA shall also focus on establishment and modernization of fish landing centres linked with fish carrying insulated van or live fish carrier van so as to get maximum remunerative price from the fishes.
- Infrastructure facilities like fish processing plants (viz. canning plants), fish drying platforms, solar drying, dry fish storage shed, boat and net building yard, approach road shall be implemented by converging with other activities.
- Department shall emphasize on establishment of district level fish disease and diagnostic labs, Aqua-shops to create employment avenues among the qualified job seekers.

16 Policy for public private partnership (PPP)

- Government shall promote public private partnership model for setting up enterprises in fisheries sector so as to harness the fishery resources in the State in most effective manner.
- AFPA shall focus on involvement of PPP concept in developing and establishing modular cage culture, wetland aqua-tourism in Assam Beel.
- AFPA envisages integrated and holistic development of one district Beel as a Model Beel under PPP mode which shall act as a Beel demonstration unit in future.
- Fisheries cluster based development initiatives such as cold chain, processing and value addition shall be established with the active participation from private stalwarts.
- AFPA shall focus on involvement of national and multi-national public sector giants like Indian Oil Corporation, Oil India Ltd., ONGC, NRL, or such type of organizations to be involved as a partner of development in fisheries sector under corporate responsibilities initiative in order to bring a holistic development in fisheries.

17 Policy for entrepreneurship development, self employment and fishers' livelihood and welfare

- Government shall play a catalytic role in self employment through developing private entrepreneurship in fisheries, in the areas of fish farming, integration of fish culture with livestock rearing and paddy cultivation, fish seed production, ornamental fish trade, fish processing , production of value added fishery products ,fish marketing (whole sale and retail), fish trading /vending, transport operation, net mending and repairing, setting up of small scale industrial units for fish feed and seed plants, production of fishing equipments, trading of aquaculture equipments, etc.
- Government shall extend all the facilities to the fishermen which are available under the existing welfare scheme of Government of India/Government of Assam.
- Government shall ensure how best fishermen/women could be involved in other activities as a source of alternative livelihood during ban period. Pen and cage culture for seed rearing and growing, net making, etc. are some of the examples for alternative livelihood to them.
- AFPA shall focus on creating employment generation and rural livelihood through fisheries by extending assistance to the fishers for new pond construction, pond renovation, development of ornamental and Beel fisheries for production and productivity enhancement.
- Appropriate steps shall be taken to ensure that quality education and health care, housing shall be made available to the families of the fishermen. Fishermen habitation shall be provided with safe drinking water, roads, etc.
- Institute like Fisheries polytechnic shall also be established. (In this regard proper assessment of manpower requirement in different sectors of fisheries and aquaculture of the state is essential)
- All the potential fish farmers shall be trained in the Professional Fisheries Institute both inside and out-side the State.
- Progressive fish farmers would be sent for exposure visit to States like Andhra Pradesh, West Bengal, Jharkhand, Chhattisgarh for advanced and quality learning.

18 Policy for convergence and linkages

- For promotion of fishery sector, participation and convergence shall be ensured with the other line Departments like Water Resources, Forest and Environment, Revenue, Agriculture, Animal Husbandry, Cooperative, etc. and other funding sources like Central Government, , MGNREGA, NFDB, ICAR, NEC and EAP.
- All the programmes of State, Central Government, NFDB, ICAR, NEC or other funding agencies including EAP shall be implemented through a single window. The State Project

Management Unit (SPMU) under section 4 of the Policy shall be well equipped for effective implementation of the projects. SPMU shall be the nerve centre for planning, development and implementation of schemes, projects etc. in the State.

- A task force committee headed by Principal Secretary, Fishery Department or Commissioner and Secretary in absence of Principal Secretary, Director of Fisheries as member Convener and other major stakeholders as members shall be constituted to deliberate on the issues concerning fisheries and aquaculture. SPNO shall be the one of the member of the committee.
- Steps shall be taken to involve national and international agencies like NFDB, ICAR, SAU, CAU, NABARD, NCDC, MPEDA, World Bank, World Fish Centres, etc. For development of fisheries sector in Assam.

19 Fisheries Credit Policy

- As in Agri-sector.

20 Policy for research & development including technology upgrading

- Research and development is the backbone of development. College of Fisheries under Assam Agricultural University has been mandated for research and development activities in fisheries and aquaculture. Technology upgradation programs are also a part of the R& D and has been entrusted to the Assam Agricultural University.
- Sufficient qualified Departmental Officers are already in place and hence the policy shall emphasis for undertaking R&D projects, TUPs under ICAR, NFDB, DBT, GoI, NEC, EAP, etc. by the Department through SPMU considering changing scenario of fisheries and aquaculture throughout the globe. SPNO shall be the Principal Investigator of such type of R&D projects. Department shall bring out detailed modality and guidelines in this regard.
- All R&D projects, TUP projects to be run by the Department, an amount of 10% of the total project cost shall be taken as Institutional Charge which shall be deposited and utilized by the Department under Administrative Expenditure head.

21 Monitoring evaluation and policy review

- The progress of implementing the Assam Fisheries and Aquaculture Policy, 2016 requires an effective monitoring and evaluation mechanism with appropriate and efficient feedback mechanism.
- SPMU shall be entrusted with providing systematic inputs for refining the policy depending on the future needs, its implementation and management, to handle inter-sect oral issues and to protect the interest of fishers and fishing community.

- Policy shall be reviewed both by internal and external agencies in every five years to continue to align with successive five year plans, national priorities, global issues, impact of climate changes, fisheries governance, etc.

Some General Policies across the Sectors

Agro-tourism development: Suitable agro-tourism models for both the flood and non-flood situations shall be developed in collaboration with Forest and Tourism Departments. The university shall be supported to develop such models.

Formation of South Asian Agri Forum: In view of the Act-east policy as well as regionalization of food bowls, attempts shall be made to develop South Asian/South-east Asian Agri Forum for technology/information sharing and benefiting from the liberalized agri-trade.

Complimentary/supplementary and specialty agriculture: Normally, national and global agricultural markets are talked about forgetting the vast market potentials within the North Eastern Region. The policy shall, therefore, be to explore within the region agri trade and commerce, particularly, for the specialty products of the state while supplementing and complimenting the efforts of each of the NE states for production planning and market mobilization. For this, the Chief Minister of the state may initiate necessary dialogue with his counterparts in the other NE states.

Special efforts to produce 'Make in Assam' agri products: In order to capture international food market with the specialty products of the state like its lemon, joha, bora and red rice, *bhot jalakia*, black pepper, bananas like *malbhog, chenichampa, athiya kal*, Karbi ginger, ornamental fishes etc. together with their value added products, proper facilities right from production planning to grading, packaging and branding shall be created and off-farm job avenues framed.

Hunger-free Assam: A special package shall be developed to identify the hungry population area-wise and engage them in livestock/fish centric livelihood options and/or engage them in off-farm activities to address their poverties. Agricultural skill injection into this population shall also be explored to man the production/processing sector.

Establishment of agri by-product based industries: Since the state lacks avenues to support agri by-product based industries like leather, bone meal, meat meal, fish meal etc., a special policy thrust shall be to promote such industries by establishing organized animal slaughter houses and processing centres.