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New Agricultural Education Policy for Reshaping India

NATIONAL ACADEMY OF AGRICULTURAL SCIENCES, NEW DELHI
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Preface

Human resource capital is the greatest treasure of a nation. To enrich this treasure, Hon'ble Prime Minister Shri Narendra Modi provided a historic National Education Policy for transforming India's education system, seeking reforms at school, college, and university levels to build a knowledge-driven society, and allocated Rupees hundred thousand crore for its implementation to begin with. The NEP 2020 clearly sees the need for reviving agricultural education, and the National Agriculture Education Policy (NAEP) must be aligned with NEP and based on its five pillars, namely, Access, Equity, Quality, Affordability, and Accountability to achieve the 2030 Agenda.

NEP 2020 gave a detailed description of how education should be dealt with starting from pre-school to school to higher education in a holistic manner. Realizing that ICAR/DARE have the mandate of regulating and observing quality education in the country, the National Academy of Agricultural Sciences (NAAS) organized a Brainstorming Session on "New Agricultural Education Policy for Reshaping India" to be aligned with NEP 2020 on October 20, 2020 and suggested the way forward to have a re-engineered Agricultural Higher Education Policy for India, as contained in this Policy Paper. Recalling the pioneering work done by the Academy during the past two decades for formulating agricultural education policies, especially the recommendations of the international Agricultural Science Congress organized on "Transforming Agricultural Education" in 2013, Bhubaneswar, and the famous Bhubaneswar Declaration, and appreciating the various initiatives and leads of the ICAR aligned with NEP 2020, the Session urged for judicious implementation of the previous recommendations, fortification of the ongoing initiatives, and implementation of the new recommendations.

The Policy Paper details the way forward for transforming agriculture institutions into multi-disciplinary research-intensive Higher Education Institutions (HEIs), along with changes in course curricula, academic structure of degree/ diploma/certificate system, credit banking, multiple entry-exit, partnerships among HEIs, universities, industry and other national and international stakeholders delivering high quality holistic higher education in the agriculture-food system with equity, inclusion, flexibility, and due provisions for vocational education and entrepreneurship development, as envisioned by the NEP 2020. Keeping the smallholder farmer at centre stage, it also seeks academic legitimacy of integrating Science Social Responsibility with Corporate Social Responsibility to promote the role of private sector in education, and to enhance synergy between Science of Discovery and Science of Delivery to ensure adoption of new technologies and innovations by all concerned.

I express my gratitude to Prof. R.B. Singh, Convener, and Prof. Anil Kumar Singh, Co-Convener, for the most timely organization of the Brainstorming Session on this very topical subject, and for coming out with this invaluable policy paper. Thanks are also due to the Editors, Dr P.S. Birthal and Dr Malavika Dadlani for meticulously shaping the paper.

I am sure, the concerned Policy Makers, the Ministry of Education, DARE/ICAR, UGC, NITI Aayog, and other stakeholders will benefit from this Policy Paper and jointly help in meeting the Prime Minister's pledge to transform India into a global knowledge power - Vishwa Guru.

(Trilochan Mohapatra)
President
National Academy of Agricultural Sciences

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New Agricultural Education Policy for Reshaping India

1. EDUCATION IN A HISTORICAL PERSPECTIVE

1.1 General education

India has a rich heritage of higher education, dating back to about six thousand years, especially since the Vedic period. After independence in 1947, the Government of India initiated several programmes to address the problems of illiteracy. Maulana Abul Kalam Azad, India's first Minister of Education envisaged a strong control of the Central Government over education to evolve a uniform education system throughout the country. The Government established the University Education Commission (1948–1949), the Secondary Education Commission (1952–1953), the University Grants Commission and the Kothari Commission (1964–66) to develop proposals for the modernization of the education system. The Resolution on Scientific Policy adopted by the Government aimed at the development of high-quality scientific education institutions such as the Indian Institutes of Technology. In 1961, the Government formed the National Council of Educational Research and Training (NCERT), an autonomous organization to advise the central and state governments in formulating and implementing education policies.

Based on the recommendations of the Kothari Commission, the Government of India announced the first National Policy on Education in 1968 (NPE 1968), which called for a "radical restructuring" for equal educational opportunities to achieve national integration and greater cultural and economic development. It called for compulsory education for all children up to the age of 14 as stipulated in the Constitution of India. It also encouraged the teaching of the ancient Sanskrit language, an essential component of India's cultural heritage. The NPE 1968 called for increasing the spending on education to 6% of the gross domestic product (GDP).

In 1986, the Government of India brought out a new National Policy on Education that emphasized *the removal of disparities and to equalize educational opportunity,* especially for the women, Scheduled Tribes (ST) and Scheduled Castes (SC). To achieve this, it suggested expanding scholarships, adult education, recruiting more teachers from the SCs, incentives for the poor families to send their children to school regularly, development of new institutions and providing housing and services. It also focused on a *child-centric approach* in primary education. The NPE 1986 expanded the Open University System with the creation of Indira Gandhi National Open University (IGNOU) in 1985. Further, it called for a *rural university* model to promote economic and social development at the grassroots level. It also re-iterated an increase in spending on education equaling 6% of the GDP.

The NPE 1986 was modified in 1992. In 2005, a new policy called “Programme of Action (PoA) 1992” was adopted. The NPE 1986 had envisaged conducting a common entrance examination on all India basis for admission to professional and technical programmes. For Engineering and Architecture/Planning programmes, the Government of India vide Resolution dated 18 October 2001 laid down a *Three – Exam Scheme,* i.e., JEE and AIEEE at the national level, and State Level Engineering Entrance Examinations (SLEEE) for state-level institutions – with an option

to join AIEEE to take care of varying admission standards in various programmes and help in the maintenance of professional standards and solve problems of multiplicity of entrance examinations.

1.2 Agricultural education

India has a rich history of agricultural education also. Agriculture was in the curricula of Nalanda and Takshila Universities. Education in agricultural sciences started in 1877 with the establishment of an agriculture college at Saidapet in erstwhile Madras state, and later three veterinary colleges at Bombay (1886), Calcutta (1893) and Madras (1903). Subsequently, five agricultural colleges were established at Kanpur, Coimbatore and Nagpur (1905), Pune (1907) and Sabour (1908). At the time of independence, the country had seventeen agriculture colleges, four veterinary colleges and one agricultural engineering college. Realizing the importance of agriculture in the Indian economy, the Government of India initiated a series of reforms immediately after independence. Self-sufficiency in food production became an overriding priority. The first Prime Minister of India, Pandit Nehru said, "*Everything else can wait but not agriculture*".

Soon after independence, the Government of India appointed the Indian University Education Commission headed by Dr S. Radhakrishnan to review the status of higher education and suggest improvements to meet human resource requirements. The Commission's report was published in 1949 and its recommendations helped greatly to shape the destinies of higher education in India. Referring to agriculture education, the Commission remarked that the country's position regarding food production was pathetic. The Commission envisioned rural universities that would usher the generation and use of new knowledge, skills and technology needed to develop India. On scientific manpower, the Commission stated that the number of PhD and DSc degrees in six basic sciences during 1938-1949 was only 260, an average of 26 per year. The Commission urged that the country needs a constant flow not only of scientific workers but also of scientific leaders.

India achieved remarkable growth in food grains production from 51 million tonnes in 1951 to over 308 million tonnes now (2020-21). The cradle of this success has been the establishment of institutions of higher learning which created skilled human resources for the generation of technologies and their dissemination. This was ably assisted by sound government policies and high receptivity of the farming community. The establishment of the Postgraduate School at Indian Agricultural Research Institute (IARI) and Deemed University status in 1958 was a step towards the development of human resources in agriculture. Based on the recommendations of the first and second Indo-American Joint Teams, the first Agriculture University was established at Pantnagar (Uttar Pradesh) in 1960 on the Land Grant Pattern of the USA that envisioned integration of education, research and extension. This was followed by the establishment of agricultural universities in other states on the same pattern.

The extensive spread of agricultural universities and colleges has opened opportunities for higher agricultural education and has paid rich dividends mainly because of the integration

of education, research and extension. It was a major departure from the traditional system of education. The Land Grant Pattern of the USA based on the Morrill Act (1862), was successfully implemented because of initial support from the Land Grant Universities. It provided for major (50%) support from the federal (central) government in terms of endowment/corpus fund, and state government (35%) for ensuring the university's autonomy; and the remaining to be raised by the university. During the early period, all the states were keen to develop agricultural education and therefore, provided wholehearted support. The Indian Council of Agricultural Research (ICAR) also provided substantial support amounting to 30-35% of its budget. This led to the establishment and nurturing of agriculture universities in the country (ICAR, 2013).

To ensure uniform structure and effective governance across agricultural universities, the ICAR developed a Model Act in 1964, which was revised time and again, and the last revision happened in 2009. The ICAR established an Accreditation Board in 1996 for a comprehensive process of accreditation of State Agricultural Universities (SAUs), periodic revision of course curriculum, and academic regulations through the Deans' Committees to assure quality agriculture education. Initiatives launched by ICAR paid rich dividends, but there exists vast scope for improving the standards in academics, governance, financial health and human resource development. New initiatives have to be taken both at the system and university/ institution levels to create an enabling environment for innovation and creativity and develop the system's capacity for educational planning, quality assurance, and institutional partnership and networks.

2. THE STATE OF AGRICULTURAL EDUCATION AND CHALLENGES

The agricultural education system in India comprises of 75 Agricultural Universities (AUs) structured on the Land Grant pattern of the USA - integrating teaching, research, and extension. Of these, 63 are State Agricultural Universities (SAUs), three Central Agricultural Universities (CAUs), five Deemed Universities (DUs) and four Central Universities with agricultural faculty. These along with 106 institutes within the ICAR, 721 Krishi Vigyan Kendras (*Agriculture Science Centres*), and 69 All India Coordinated Research Projects (AICRP) make India's National Agricultural Research and Education System (NARES) the largest in the world. The NARES has generated the needed scientific manpower, teachers, technologies and their transfer to transform India from the ***Ship-to-Mouth*** to the ***Right-to-Food*** status, rendering India as a major exporter of agri-food products and the second largest agrarian economy in the world.

Agricultural higher education is a state subject, but higher education is on the Concurrent List in our Constitution, and therefore, the modus operandi for implementation has to be modified accordingly. The Agricultural Universities have the mandate of research, education and extension with a strong focus on farmers, which is different from the traditional universities. Thus, while aligning with the National Education Policy 2020 (NEP 2020), the ICAR must continue to strive for the quality of agriculture education.

It is perhaps the right time to bring agriculture on the Concurrent List. India's agrarian progress during the past few years has slackened and serious asymmetries are noted in the science-led

growth of agriculture. Moreover, enigmatically, world's one fourth hungry and malnutritioned, especially stunted and wasted children, have their homes in India, let alone the huge income and livelihood inequities between the farmers and non-farmers.

The above could partly be attributed to the following shortcomings:

i) Inadequate academic rigor, and contextualization of the emerging challenges and opportunities; erosion of basic sciences from agriculture course curriculum; poor quality and insufficient academic staff (faculty positions remaining unfilled); widening disconnect between education, research, and extension; limited internalization of relevant international trends and developments; and the indifference of youth towards agriculture.

ii) Disconnect between agricultural education and employment; lack of adequate skills, entrepreneurship and experiential learning; and poor employability of agriculture graduates.

iii) Extensive inbreeding, and low access of agricultural education to rural students, especially to the tribal and socially-deprived communities.

iv) Poor system of evaluation, monitoring, impact assessment, accountability, and incentives; limited digitalization; and inefficient governance.

Inadequate investment and declining financial resources in agricultural universities/colleges; the opening of new institutions without matching resources and norms; unmindful splitting of agricultural universities, inadequate resource planning, and poor coordination between Centre and states.

3. ROLE OF NAAS IN NATIONAL AGRICULTURAL EDUCATION SYSTEM

In the recent past, the National Academy of Agricultural Sciences (NAAS) took two major initiatives to analyze the status and prospects of India's agricultural education: (i) A National Workshop on Redefining Agricultural Education and Extension System in Changed Scenario, convened by Prof Panjab Singh in 2004 (Policy Paper 31), and (ii) Eleventh Agricultural Science Congress — Transforming Agricultural Education for Reshaping India's Future in 2013 (Proceedings edited by Prof R.B. Singh) (NAAS, 2014). The salient points and recommendations emerging from these events are briefly mentioned below.

3.1 Redefining agricultural education and extension in the changed scenario

The globalization of agriculture is posing a big challenge to Indian agriculture, and to align with the changing global scenario the agricultural education and extension system has to be redefined. The market-oriented agricultural education and extension along with the changes in agricultural marketing policy for the national and international market is the need of the hour. A cadre of social scientists from agricultural related disciplines such as agricultural economics, agri-business, marketing management, rural sociology, agricultural anthropology, and agricultural ethics and politics, has to be created to diagnose problems and prescribe solutions to the global problems in the local context. This implies a re-organization of agricultural education with an emphasis on social sciences for effective agricultural policy research. Such a re-organization

will empower our agri-graduates and scientists to face up the challenges of the national and international markets.

The Academy also emphasized the need for pursuing agriculture as a profession/job and highlighted that it is influenced by motivational aspects such as monetary gains, employment, a better quality of life and social acceptance, which may attract and retain youth in agriculture. Further, educational courses on environmental and sustainable agriculture should be introduced to create an environment-sensitive faculty. A workshop on the subject was organized in Delhi by NAAS on December 10, 2004. The recommendations emerging from the workshop fell in the following three broad areas:

- Challenges facing agricultural education and their implications
- Quality, relevance, reach and preparedness.
- New strategies and institutional reforms to meet the challenges

Tamboli and Nene (2013) observed that as the agriculture sector is becoming more complex due to globalization and climate change, and to cope with these challenges India need quality trained human resources. The SAUs, which generate these resources, have, however, deteriorated in recent decades. Tamboli and Nene (2013) identified the following constraints: (i) difficulty in attracting bright, talented students, (ii) funding crunch, (iii) a large number of vacancies, (iv) inbreeding of faculty, (v) lack of autonomy to the Vice-Chancellors, and (vi) poor State-Centre and State-SAU relationships.

3.2 Eleventh Agricultural Science Congress: Transforming Agricultural Education

The XI Agricultural Science Congress held in February 2013 at Bhubaneswar, had its theme “Transforming Agricultural Education for Reshaping India’s Future”. It was a meet of global leaders in the field of agricultural education representing policy makers, academicians, managers, educationists, researchers, scientists, teachers, students and farmers and it critically analyzed the challenges and suggested a pathway to a prosperous and evergreen India. Its proceedings contain recommendations for concrete actions for enhancing investment in agricultural education, research and extension; granting financial and functional autonomy to the universities; promoting meritocracy; and overhauling governance, curricula standards, and quality assurance mechanisms.

Another message that emerged from the ASC was that we must bring ourselves back on track, restore the interrupted journey of SAUs and build a robust and responsive Agricultural Research Education and Extension for Development (AREE4D) system. Towards shaping India to achieve the future we want, it must be realized that we cannot think of a world without thriving, multifunctional and comprehensive agriculture. And this is closely linked with the transformation of India's Agricultural Education System. As freedom from hunger is still a far cry, the urgency for change can hardly be over-emphasized. Agricultural education, research and extension institutions are, therefore, increasingly challenged to transform to produce newer technologies, create a comprehensive knowledge pool, and strengthen trained, skilled and re-tooled human

resources to meet the challenges and harness new opportunities unleashed by technological revolutions.

We must assure ourselves that (i) today's agricultural leadership is ready to address the complex demands put on agriculture and our agricultural education system is prepared to produce such leaders, (ii) we have experts who can assess veritable asymmetries in agricultural education and prepare staff and students possessing the real-world experience to iron out and manage the asymmetries, and (iii) the universities have the necessary resources, autonomy, governance and commitment couched in the desired political will to meet the challenges (Singh, 2014).

The various thought-provoking papers based on the rigorous situational analysis presented by leading Indian and foreign experts had revealed that all is not well with the AREE4D system and it needs serious transformation towards reshaping India's future. In particular, it highlights the importance of quality assurance, governance and investment in agricultural education, youth employability and preparedness to capture the fast-changing entrepreneurial opportunities, inclusiveness and women empowerment to meet the demands arising from the fast feminization of agriculture, an urgency to harness the latest technologies and ICT for benefitting from the vast and ever-expanding knowledge pool to align our agricultural education system with the most responsive agricultural research, extension and innovation system nationally and internationally.

The Congress also issued a Bhubaneswar Declaration on the theme, which has been widely cited (Annexure 1).

4. NATIONAL EDUCATION POLICY 2020

The Ministry of Human Resource Development released a Draft New Education Policy in 2019, for public consultations. The Draft NEP contemplated reducing the curriculum content to enhance essential learning, critical thinking and more holistic experiential, discussion-based and analysis-based learning. It also suggested revision of the curriculum and pedagogical structure from a 10+2 system to a 5+3+3+4 system to optimize learning for the students based on their cognitive development.

On 29 July 2020, the Cabinet approved the new National Education Policy. The Policy envisions an education system grounded in Indian heritage and reshaping the country into an equitable and vibrant knowledge society by providing high-quality education to all and thereby making India a global superpower. The fundamental principles that will guide both the higher agriculture education system and individual institutions are:

- Recognizing, identifying, and fostering unique capabilities of each student, thus promoting each student's holistic development.
- Flexibility enables the learner to choose their path in life according to their talents and interests.
- No hard separations between arts and sciences, between vocational and academic streams.
- Multi-disciplinary and holistic education across the science, social science, arts, humanities,

and sports, promoting the integrity of all knowledge.

- Emphasis on conceptual understanding.
- Creativity and critical thinking to encourage logical decision-making and innovation.
- Ethics and human & constitutional values like empathy, democratic spirit, scientific temper, justice, and respect for public property.
- Promoting multilingualism and the power of language in teaching and learning.
- Life skills such as communication, cooperation, teamwork, and resilience are to be promoted.
- Focus on regular formative assessment for learning rather than encouraging "coaching culture"
- Extensive use of technology in teaching and learning, increasing access to Divyang students, removing language barriers, and in educational planning and management.
- Respect for diversity and the local context in all curricula, pedagogy, and policy.
- Full equity and inclusion ensure that all students can thrive in the education system.
- Synergy in curriculum across all levels of education, from primary school to university level higher education.
- Teachers and faculty are the heart of the learning process.
- Outstanding research is a must for outstanding education and development.
- Continuous review of progress based on sustained research and regular assessment by an educational expert.
- Rootedness and pride in India, its culture, heritage, tradition and knowledge system.
- Education is a public service and must be a basic right of every child.
- Substantial investment in a strong, vibrant public education system and encouragement and facilitation of true philanthropic private and community participation.

It is gratifying that, as discussed earlier, several of the principles enunciated in the NEP 2020 are already included in the NAAS recommendations and the ongoing reforms by the ICAR. Thus, the New Agricultural Education Policy can readily be aligned with the NEP 2020.

The NEP 2020 emphasizes raising educational investment, as there is no better investment towards a society's future than the high-quality education of our young people. Unfortunately, public expenditure on education in India has not come close to the recommended level of 6% of the GDP. The current public expenditure on education stands around 4.43% of the GDP, which is far smaller than in several developed and developing countries. Higher investment is critical for achieving a high-quality and equitable public education system.

The NEP 2020 also underlines the problems faced by India's higher education system such as fragmentation of the education ecosystem, insufficient emphasis on cognitive skills, rigid

compartmentalization of disciplines, fewer institutions in socio-economically disadvantaged areas, limited autonomy, neglect of meritocracy, lesser emphasis on research, poor governance and leadership, ineffective regulatory systems and low standards of undergraduate education.

The NEP 2020 provides a detailed description of how education should be dealt with starting from the pre-school to school and higher education in a holistic manner and touched upon agricultural education very briefly in the document. The Indian Council of Agricultural Research (ICAR)/ Department of Agriculture Research and Education (DARE) has the mandate of monitoring, regulating and quality enhancement of agricultural higher education in the country. After the announcement of the National Education Policy, a need was felt to discuss its implication on Agricultural Higher Education and how it could be harmonized for effective implementation. With this objective in mind, the NAAS organized a brainstorming session on "Transforming Higher Agricultural Education in India to be Aligned with NEP 2020" on October 20, 2020, and suggested the way forward given below.

5. TOWARDS A NEW AGRICULTURAL EDUCATION POLICY ALIGNED WITH NEP 2020

5.1 A new form of multi disciplinary

Recalling that agriculture is the mother of all cultures, the NEP 2020 should facilitate the creation of a comprehensive New National Agricultural Education Policy (NNAEP) to transform agriculture to build New India. The NEP 2020 has seen the need for reviving agricultural education with allied disciplines regulated and supported by the ICAR.

The New National Agricultural Education Policy must be aligned with the National Education Policy 2020, which is based on five pillars, viz., access, equity, quality, affordability, and accountability. The contemplated changes include transforming the institutional structure to new a form of multi-disciplinary research-intensive Higher Education Institutions (HEIs), course curricula, academic structure of degree/diploma/certificate system, credit banking system, partnerships among HEIs, universities, industry and other stakeholders, while continuing the focus on agriculture on the lines of medical education, thus delivering high-quality higher education in the agriculture-food system, with equity and inclusion. As India will have the highest population of young people in the world over the next decade, this structure will enable the country to provide quality education. The educational system must also contextualize new and emerging issues such as the unprecedented Covid-19 pandemic, climate change, increasing biotic/abiotic stresses, socio-economic crises, bio-safety/food-safety concerns, fast diminishing natural resources including biodiversity, and risk assessment and management. The academic legitimacy of producing More from Less for More (MLM) would become doubly important.

Given the above, SDG4 "*ensure inclusive and equitable quality education and promote lifelong learning opportunities for all"* is most timely, and the entire education system, from school to higher education, must be configured to support faster learning. Thus, SDG4 will be directly impacting SDG1 (alleviation of poverty) and SDG2 (elimination of hunger) – the foremost goals of agricultural development.

The New India must address 21st-century development imperatives, and seek revamping of educational structure, regulations and governance to meet SDGs while building upon India's traditions and value systems. We must enhance the creative ability and strengthen the social, ethical, and emotional capacities of all.

The Prime Minister elaborated the aim of the National Education Policy at the education conclave held on August 7, 2020, and led the pledge to implement it effectively, including allocation of Rupees hundred thousand crores to begin with. The NEP envisions an educational system that makes good human beings with skill and expertise contributing directly to transforming our nation sustainably into an equitable and vibrant knowledge society. By providing high-quality education we shall be making our students' global citizens, rendering NEP as the foundation for New India. Re-training, up-skilling, and re-tooling of teachers, students, and related staff, bridging the gap between education and research adopting a holistic approach, strengthening vocational education, autonomy to institutions, and establishing a self-sufficient domestic ranking system for Indian educational institutions, are the main planks of NEP 2020. Consequently, the Ministry of Human Resource Development (MoHRD) has been renamed the Ministry of Education (MoE).

The Vision of the NEP is an equitable and vibrant knowledge society, and its main tenets are:

- Make India a global knowledge superpower.
- Students having respect towards *Fundamental Duties and Constitutional Values.*
- Pride in being Indian in thought, intellect, and disposition.
- Develop knowledge, skill, values, commitment to human rights, sustainable development and global well-being- truly global citizens.

Like the NEP, the NNAEP should be progressive, futuristic, and student-centric. This will promote flexibility, multi-disciplinarity, and internationality in consonance with people's needs, aspirations, voices from the ground (***Janvani***), and science-informed amalgamation of indigenous and endogenous traditions, knowledge, and cultural heritage (***Bhartiyata Ka Dharatal***), ensuring holistic development, as envisioned in the NEP 2020. It must also provide for multiple entries and exits as well as horizontal and vertical mobility, facilitated by *Credit Bank*, thus encouraging aptitude-based choice and self-paced progress according to access, equity, and affordability.

The NEP 2020 highlights that although Agricultural Universities comprise approximately 9% of all universities, enrolment in agriculture and allied sciences is less than 1% of all enrolments in higher education. Both capacity and quality of agriculture and allied disciplines must be improved to increase agricultural productivity through better-skilled graduates and technicians, innovative research, and market-based extension linked to technologies and practices. ***The preparation of professionals in agriculture and veterinary sciences through programmes integrated with general education should be increased sharply. The NEP 2020 underpins that the design of agricultural education will shift towards developing professionals with the ability to understand and use local knowledge, traditional knowledge, and emerging technologies while being cognizant of critical issues such as declining land productivity,***

climate change, food sufficiency for our growing population, etc. Institutions offering agricultural education must benefit the local community directly; one approach could be to set up Agricultural Technology Parks to promote technology incubation and dissemination and promote sustainable methodologies.

5.2. From land grant to world grant agricultural university system

The architects of NEP 2020 must be pleased to know that the NAAS has been strongly pleading for stopping the splitting of SAUs and building multi-disciplinary, research-intensive holistic universities. In the spirit of ***Reform, Perform and Transform***, and recognizing that local and global are no longer independent, the NAAS underpinned that India's Agricultural University System should change from Land Grant to *World Grant* system, as happened in many Land Grant Universities in the USA. The new curricula, courses and contents should keep evolving, dynamically encompassing the new global initiatives, such as Global Green Economy; Knowledge Economy; Digital Economy, Global Zero Hunger Challenge, etc. Reiterating the role of agriculture and social sciences as pivotal agents of change, it is suggested that Agriculture, Arts, and Humanities (A), be amalgamated with Science, Technology, Engineering, and Mathematics (STEM), thus transforming ***STEM*** into ***STEAM***. Further, India should move towards the ranking of its SAUs for raising the level of knowledge domains, meritocracy and governance as per the indicators suggested by the National Academy of Agricultural Sciences (NAAS) to make our students globally relevant and truly global citizens.

Synergizing excellence and relevance, new approaches towards building qualified human resources, for instance, custom-designed Massive Open Online Courses (MOOC) and establishing internship, innovation and incubation centres are being popularized in NARES. It has also prepared a roadmap for mentoring, emphasizing the need for matching the experience and wisdom of mentors with the learning needs of mentees, thus building bridges across the hierarchy levels, empowering change management, enhancing work ownership and sharing of responsibility, and expanding learning ecosystem and good practices. This is in line with the programmes of the Department of Science and Technology (DST), especially Innovation in Science Pursuit for Inspired Research (INSPIRE) and the Global Initiatives of Academic Network (GIAN) of the Ministry of Human Resources Development (MoHRD), now Ministry of Education (MoE). Thus, rejuvenated agricultural education would transform the agrarian economy, and attract foreign students, rendering the Government's *Study in India* initiative a success.

As enunciated in the NEP 2020, ***the NARES should assess manpower needs of the fast transforming, knowledge-intense agriculture to make the necessary adjustment in curricula and skill development, emphasizing experiential learning and exposure to national and international issues. More technological interventions are likely in the disciplines of ICT, digitalization, biotechnology, nanotechnology, agro-processing, Artificial Intelligence (AI), precision agriculture, and systems simulation. A pluralistic/ multidisciplinary/holistic approach and public-private partnership, focusing on business/***

marketing/income orientation, are needed for making the local extension sensitive to the challenges at a micro level, strengthening the feedback mechanism, and setting the right priorities to resolve farmers' problems. Promoting entrepreneurship and Agri-Startups, encouraging market-led extension strategies, and intensive use of electronic media should be duly covered in the educational programmes, thus mutually synergizing the Scientific Social Responsibility (SSR) and Corporate Social Responsibility (CSR).

Further, online teaching, training, learning technology sharing and market access will be actively promoted. The necessary quality technology infrastructures must be ensured for uninterrupted running of the system to institutionalize the Open Distance Learning mode (ODL) of agricultural education.

5.3. Leveraging ongoing initiatives for internalizing NEP 2020 in the new agricultural education policy

Keeping in view the NEP, and recommendations arising from the NAAS's XIth Bhubaneswar Conference and Declaration 2013, the ICAR- Committee for Developing Policy for Higher Agricultural Education in India, 2013, and Fifth Deans Committee, 2016, chaired by Prof. R. B. Singh, the following measures and actions should be internalized in the new National Agricultural Education Policy.

- ***Embrace agricultural education for development (AE4D) as an integral component of the national agricultural policy in creating a world-class agricultural university system attuned to face local, national, and international challenges and opportunities.***
- ***Establish large multi-disciplinary educational and research universities (MERUs), at least one in or near every district.***
- ***Ensure and institutionalize transparent governance, autonomy, meritocracy, judicious allocation of resources, and accountable systems of evaluation (measure to manage), monitoring, and impact assessment.***
- ***Minimize inbreeding and promote institutional linkages, focusing on standards, norms, and accreditation; strengthen basic and emerging sciences in agricultural education and research; nurture centres of excellence***
- ***Reaffirm integrity of faculty and institutional leadership positions through merit appointments and career progression based on teaching, research and extension service.***
- ***Establish a National Research Foundation to fund outstanding peer-reviewed research in universities and colleges.***
- ***Governance of HEIs by high qualified independent boards having academic and administrative autonomy.***
- ***Strengthen and streamline Centre-state partnership with differentiated but reiterative responsibilities.***

- ***Ensure access, equity, and inclusion through a range of measures, including greater opportunities for outstanding public education; scholarships by private philanthropic universities for students; online education, and Open Distance Learning (ODL); and all infrastructure and learning materials accessible and available to learners with disabilities.***
- ***Adopt Light but Tight regulation by a single regulator for higher education to ensure integrity, transparency, resource efficiency and good governance.***
- ***Revamp curricula, teaching/learning processes, and pedagogy to attract the best of talents and for preparing the Youth for Leadership in Agriculture***
- ***Provide support for enhanced student experiences, institutionalize skill development, entrepreneurship and experiential learning programmes, and invest in non-formal education and vocational training in agricultural technologies towards promoting professionalism***

Support development of active and long-term international cooperation, rejuvenate and replicate successful collaboration models, and launch South-South, South-North and trilateral collaborations.

5.4 Reshape agricultural education from primary school to MERU level

Agriculture (*in a comprehensive sense*) should be an eminent part of the continuum of education, from Primary School – High School – College – University. Therefore, it is important to introduce agriculture as a subject in school curricula as most of the intake at the graduate level is from rural areas. It can be easily linked with scientific topics like photosynthesis (food), soil, water, environment, weather/climate change, greenhouse gases. Some of these topics are routinely taught in school and it will be easy to link them with agriculture. There could be many other topics that may be linked with agriculture. Bengal famine is referred to as part of history and can be easily linked to the food security of the nation.

The National Agricultural Education Policy would call for retraining the teachers at various levels to promote flexibility, multidisciplinary and internationality. The teacher should no longer be *just filling a pail, but by lighting a fire*, and *good teaching is more giving of right questions than giving of right answers*. We should ask a question whether our education system is producing such leaders who would navigate us through the changing waters, and build the needed values to reach the unreached and to render our AUs world-class.

The National Agricultural Education System should produce professionals with significant skills to find solutions to the veritable challenges faced by agriculture, like low productivity, low profitability and income of farmers, increasing volatilities of climate change and market uncertainties and poor access, persisting high incidences of undernutrition, hunger, poverty, inequity, environmental degradation, shrinking and diminishing natural resources – soil, water, biodiversity. An institutionalized multidisciplinary approach is needed to solve the problems. The establishment of Multidisciplinary Educational and Research Universities will meet these requirements.

Agriculture should be seen as an industry and commercial enterprise. Increasing mechanization, automation, use of resources conserving technologies, data management, using Big Data Analytics and ICT will be the order of the day. Blockchain technologies, biosensors, non-fossil fuel, renewable energy, solar power, waste management etc. will greatly impact agri-food systems, hence must be internalized in agriculture curricula.

The NEP 2020 envisions Higher Education Institutions to focus on research and innovation by setting up:

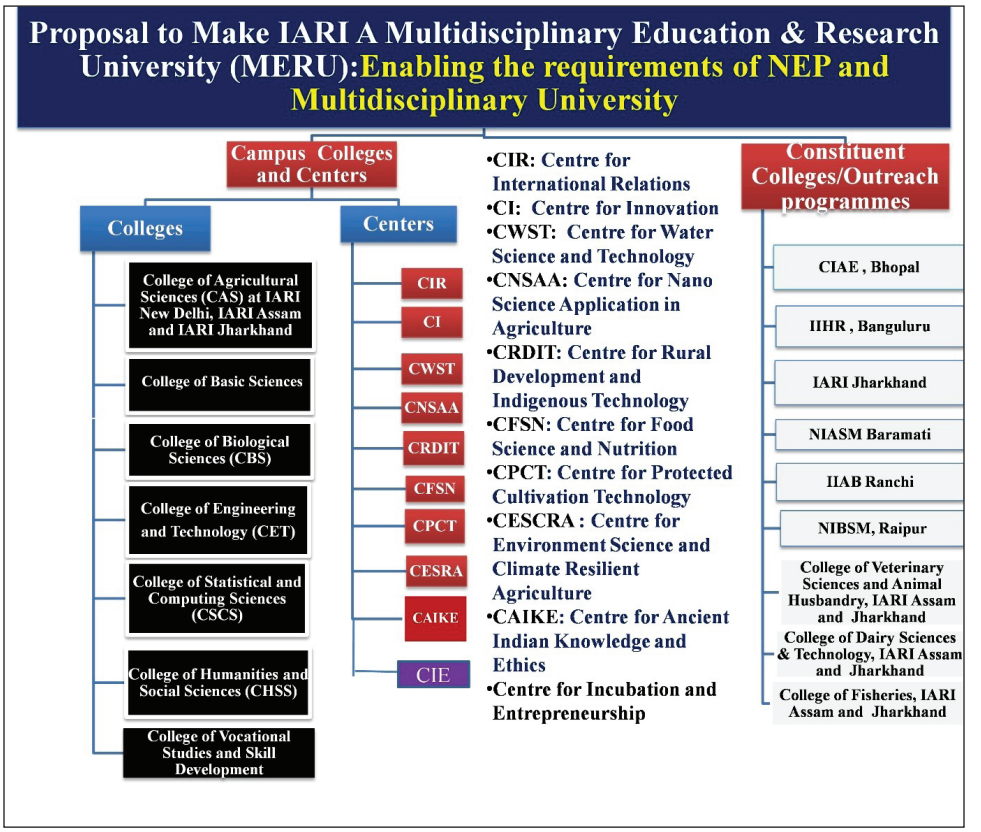
- Start-up incubation centers
- Technology development centres
- Centres in frontier areas of research
- Greater industries-academic linkages
- Interdisciplinary research including humanity and social science research.

Exit options: In the NEP 2020, there is a provision for the students to exit at the end of the first year/second year and so on with the award of a certificate/diploma. Given the current undergraduate course syllabus, the first year focuses on basic courses only. Currently, only in the fourth year, the students go for rural/industrial training. Under the multiple-entry-exit system, it has to be ensured that hands-on training and experiential learning are made available to all students. The certificate and diploma holders must go through these practical courses.

Credit banks: It is proposed to introduce transfer of credits completed in one University to another. Since there could be some variation in the curricula between inter and intra SAUs, how would this variation be streamlined so that the student does not suffer? This calls for integrating skills and experiences into a credit-based formal system by providing a credit recognition mechanism. The credit bank will digitally store academic credits earned from recognized institutions and allow for credit redemption for awarding certificates/diplomas/degrees through multiple entry provisions.

Another very vital fact that has to be considered is that in some states the State Agricultural Universities have all the Faculties i.e., Agriculture, Horticulture, Animal Sciences under one roof for instance in Gujarat, while in others there are separate universities for Agriculture, Horticulture, Animal Sciences and Fisheries. There are some traditional universities which have the Faculty of Agriculture also. In addition to private agricultural colleges and universities with agriculture as a subject, there are State Agricultural Universities (SAUs) the creation of which rests totally with the state governments. The SAUs are mandated to address all agricultural related issues which are region or local specific. For example, a state having a sizeable number of coastal districts will have different priorities compared to the landlocked states. Hill states would have different issues. There are Central Agricultural Universities (CAUs) under the administrative control of the Department of Agricultural Research and Education (DARE). The boundaries will have to be broken to synergize the new initiatives throughout the country. Cooperative federalism must be adopted with the spirit to build the desired agricultural education system to impart quality education to all aspirants.

With the above in mind, several AUs and other agricultural education institutions have initiated the restructuring process. For instance, the IARI has proposed the following model for being transformed as a MERU. Although when the SAU's were set up initially, e.g. GBPUA&T, Pantnagar, they were multi-faculty setups. Overtime, some of the SAUs were split up into discipline-wise universities as mentioned above very much against the ICAR Model Act. Is it possible to undo this with Agricultural Higher Education being a state subject? The SAUs should be converted into MERU as a part of alignment with NEP.



The MERU will give due importance to pluralistic and innovative extension approaches as these are critical for faster delivery of information and technology. Competencies of extension agencies especially youth (including women) as *Technology Agents* need to be improved by systematic capacity building to enable them to respond better to emerging challenges. To achieve this, there is a need for better knowledge sharing, skill development and mentoring of youth, making them an integral part of the *Plough-to-Plate Agri-Food System* promoting agri-partnership through a dedicated *Agri-Youth Innovation Corpus Fund* for rural start-ups. Further, as mentioned in the above outlay, colleges of vocational studies and skill development will be

established so that the intensity of vocationally trained persons is increased from 26% to 50% by 2035.

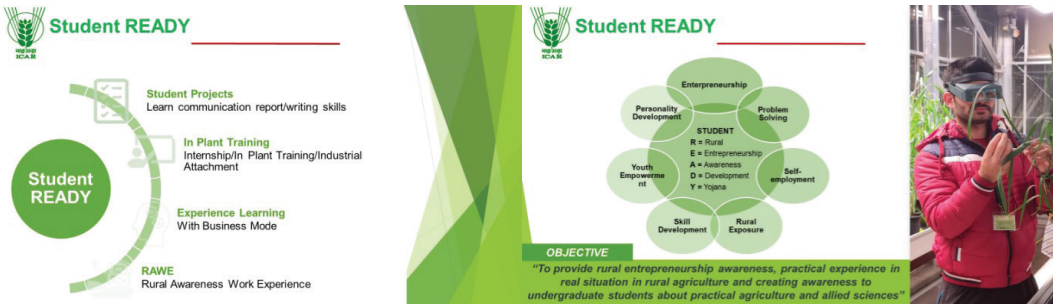
In agricultural higher education, four institutes have the status of the deemed-to-be-University under the direct control of the Indian Council of Agricultural Research (ICAR). They were given this status based on their outstanding research contributions so that MSc and PhD students can be trained to pursue research in these institutions and each of these focuses on different sectors of agriculture (crops, veterinary, dairy and fisheries). Any effort on converting these to MERUs should not dilute the focus of these institutions.

5.5 Quality assurance in agricultural education as envisaged in NEP 2020

The NEP 2020 emphasizes that *universal high-quality education is the best way forward for developing and maximizing our country's rich talents and resources for the good of the individual, the society, the country, and the world*. With this spirit, quality assurance in higher agricultural education, pursued by ICAR/DARE/SAUs, involves accreditation, framing of minimum standards for higher education, academic regulations, personnel policies, review of course curricula and delivery systems, support for creating/strengthening infrastructure and facilities, improvement of faculty competence and admission of students through All India Examination. The ICAR's Fifth Deans' Committee Report 2016 has restructured the course curricula to underpin relevant practical skills, entrepreneurial aptitude, self-employment, leadership qualities and confidence among graduates, and attracting and retaining youth in agriculture. Further, the Committee had recommended that all degrees in the disciplines of Agricultural Sciences should be declared as professional course degrees, and sought to achieve the global level of academic excellence. It had also suggested norms for establishing new colleges.

Being Vocal for Local, region-specific courses such as Coastal Agriculture, Hill Agriculture, Tribal Agriculture, etc. have been formulated. New degree programmes and courses have been recommended in emerging fields like genomics *(biotechnology),* nanotechnology, GIS, precision farming, conservation agriculture, secondary agriculture, hi-tech cultivation, specialty agriculture, renewable energy, artificial intelligence, big data analytics, mechatronics, plastics in agriculture, dryland horticulture, agro-meteorology and climate change, waste disposal and pollution abatement, food plant regulations and licensing, food quality, safety standards and certification, food storage engineering, food plant sanitation and environmental control, emerging food processing technologies, sericulture, community science, and food nutrition & dietetics. These will need additional high-quality human resources and a shift in pedagogy.

In compliance with the Student READY programme launched in 2015, depicted below, the Fifth Deans' Committee has designed a one-year programme in all the UG disciplines comprising (i) Experiential Learning, including International Experiential Learning wherever feasible; (ii) Rural Agriculture Work Experience; (iii) In-Plant Training/ Industrial Attachment; (iv) Hands-on Training (HOT) / Skill Development Training; (v) Students Projects, and (vi) the Agricultural Science Pursuit for Inspired Research Excellence (ASPIRE) programme.



As regards the gender sensitivity, between 2014-15 and 2019-20, the number of female applicants increased by 7% each in UG and PG and 11% in PhD. Another analysis showed that while the admission status of agriculture graduates gradually increased from 3982 in 2011 to 5669 in 2015, the All India Placement of agriculture graduates during the same period was rather low (20 to 22%). It further emphasizes the need for restructuring of the agriculture education system (Rana, Agnihotri and Agrawal, 2020) to generate job opportunities, knowledge sharing. Further, through its dynamic All India Entrance Examination policy and educational quality improvement programmes, the ICAR is making serious efforts to attract talent and get talented students exposed to different socio-economic-cultural settings and nurture them to constitute quality manpower. In an article in the daily Pioneer of September 12, 2020, Dr T. Mohapatra, Secretary DARE and Director General, ICAR, and Dr R.C. Agrawal, Deputy Director General (Agricultural Education), ICAR, while appreciating the essential features of NEP 2020, underpinned that the ICAR has already been pursuing several activities which are in tune with the NEP objectives. These include a focus on innovation and research-based learning, hands-on practice and field experience training, entrepreneurship, multi-disciplinary undergraduate and graduate curricula, and promotion of science-based policy options and actions. They further highlighted that towards meeting Agenda 2030, the ICAR has taken steps for attracting talent to agriculture education, promotion of internationalization, continuous professional development, and encouraging AUs to convert themselves into self-governing institutions, greater academic-industry linkages, and inter-disciplinary research, including humanities and social sciences, as reflected in the NEP. The ICAR will support the Universities to make provisions of multiple entries and exit systems in their undergraduate programmes to promote vocational training and professionalism.

R.S. Paroda Committee (2019) on attracting and retaining youth in agriculture has highlighted the following aspects:

- National Mission on Youth in Agriculture
- Youth - Agriculture Nexus
- Plough-to-Plate Initiative
- "Youth as a Farmer" to "Youth as a Value Chain Developer"
- Institutionalization of Incentive and Award/Reward System

- Successful Entrepreneurs as Role Models for Youth
- Agri-Youth Innovation Corpus Fund
- Creation of Department of Youth in Agriculture
- ICT Knowledge Enabled Youth.

The ongoing World Bank supported National Agricultural Higher Education Project (NAHEP) built on the preceding World Bank projects, particularly NATP and NAIP, has been strengthening the capacities of faculty and other staff at all levels. It is focused to foster linkages of the national system with the global knowledge economy, facilitate international experiential learning, promote learning-centred education, strengthen partnerships with private industries, and augment digitalization and online distance learning.

The NAHEP must have provisions to attract youth and empower women in agriculture. India, with the largest population of youth (nearly 400 million between 10-24 years age group) in the world, has only 5% of the rural youth engaged in agriculture though over 60% of the rural people derive their livelihood from farming and allied activities. Hence, a paradigm shift is needed from ***Youth as a Farmer*** *to* ***Youth as Value Chain Developer and Agri-preneur****. Zonal platforms for Motivating and Attracting Youth in Agriculture* ***(MAYA)*** *may be established in different parts of the country to facilitate this shift. The AUs must lead this movement by igniting the young minds with emerging and new cutting-edge technologies. Further, a gender perspective into NAHEP is necessary to effectively address the inequity and related socio-economic challenges. It is encouraging that the number of girl students in the AUs has significantly increased and this must continue. The various initiatives have significantly increased the numbers of students seeking admissions for UG, PG and PhD programmes in Agriculture, as given below:*

Programme	No. of applicants		Increase in number of applicants (%)
	2016-17	2020-21	
UG	124,995	1,97,837	58.27
PG	25,545	28,830	12.85
PhD	4,709	14,080	199.00

5.6 Regulatory system of higher education and timelines for implementation

The high-level ICAR committee has suggested the following timelines for restructuring and implementation of NEP by AUs.

2020-21

- Multiple exits and entry points into higher education may be made available by all the universities. The residential requirements of UG, PG and PhD programmes need to be relaxed so that the students wishing to exit/enter may be able to do so irrespectively of any time limit. This may be implemented by taking the approval of Academic Councils of the

University and the Board of Management.

- Compliance with Academic Bank of Credits as per the directives of the Ministry of Education.
- Deemed universities of ICAR may initiate the process for transforming into Multidisciplinary Education and Research University (MERU).

2021-22

- A common entrance test may be conducted by the ICAR for admission of the students in all the AUs. The universities need to notify accordingly based on the direction from the ICAR.
- AUs to increase at least 10% seats starting from 2021-22 academic sessions on an annual basis.
- Constitution of the 6th Deans Committee for the formulation of the UG curriculum so that the report may be submitted within 2021 itself.
- SAUs may develop their Institutional Development Plans identifying their core strength for research areas.

2030

- All institutions located in the same premises, offering either professional or general education may aim to organically evolve into multi-disciplinary institutions/clusters offering both seamlessly, and in an integrated manner.

2035

- Achieving 50% Gross Enrolment Ratio (GER) in higher agricultural education including vocational education.
- All HEIs in India aim to become independent self-governing institutions pursuing innovation and excellence. Upon receiving the appropriately graded accreditations that deem the institution ready for such a move, a Board of Governors may be established

2040

- All higher education institutions (HEIs) should aim to become multi-disciplinary institutions by 2040

The decade of 2030-40

The entire policy will be in an operational mode, following which another comprehensive review will be undertaken.

NEP based Restructuring and Implementation of Academic Programme for Agriculture Education

Sr No	Restructured Academic Programme of Agriculture Education	Period	Timeline
1	4 year B.Sc./B.Tech programme - running	On-going 4 years	Up to 2025
2	4 year B.Sc./B.Tech programme First-year: CERTIFICATE COURSE (2 semesters) (theory and hands-on training) exit option with certificate	Year one – exit option with certificate	By 2025
3	4 year B.Sc./B.Tech programme Second year: DIPLOMA COURSE (2+2 = 4 semesters) (theory and practical) exit option with diploma	Year two – exit option with a diploma	By 2025
4	4-year B.Sc./B.Tech programme 3rd year, semesters 5 &6, intensive course work and practical	Year three	By 2025
5	4-year B.Sc./B.Tech programme 4th year, semesters 7&8, advanced course work/specialization	Year four Completion of B.Sc./B. Tech degree	By 2025
6	M.Sc. 2 year programme, current system to continue as it is.	2 years	continuing
7	PhD. 2-3 year programme, current system to continue as it is.	2-3 years	continuing

An Agricultural Education Board should be established as a single regulatory body in Mega-ICAR to be responsible for ensuring high quality of education and creation and judicious implementation of the regulatory mechanisms to reshape the system to ensure that the proven and needed technology/product reaches the end-user soonest towards meeting the SDGs. The four verticals of the Higher Education Commission of India (HECI), namely, National Higher Education Regulatory Council, National Accreditation Council, Higher Education Grants Council, and General Education Council should correspondingly be represented in the Board.

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ANNEXURE - 1

BHUBANESWAR DECLARATION

We (the Congress participants) are determined to create new paradigms through the envisaged agenda for change for accelerated, inclusive, gender-sensitive and sustainable agriculture-led growth and development as that will shape India's future in the fast changing world, unleashing uncommon challenges and opportunities, and we call upon the policy-makers, education leaders, Agricultural Research, Education and Extension for Development (AREE4D) managers and development partners to:

- Embrace agricultural education and AREE4D as an integral component of the national agricultural policy to ensure adequate, consistent and predictable investments in agriculture, especially education, research and extension in creating a world-class agricultural university system attuned to face challenges and opportunities over short, medium and long terms,
- Ensure and institutionalize transparent governance, autonomy, meritocracy, dynamic assessment of human resource requirement, judicious allocation of resources, effective implementation, monitoring, evaluation, accountability and responsibility based system, and to minimize splitting and inbreeding,
- Pay focused attention to the standards, norms, and accreditation in quality agricultural education, create centres of excellence and institutes for agricultural education, science, knowledge, research, technology and innovation in an interdisciplinary and multifaculty mode,
- Identify national- and state-level public and private sector leaders with differentiated but reiterative responsibilities to work on the design and implementation of reforms and to develop a strong inter-ministerial and inter-departmental cooperation mechanism,
- Revamp teaching/learning processes and methodologies to attract best of talents and blooming young minds for nurturing them leading to a nation-wide programme on "Youth for Leadership in Farming", and

Support India's proposed development of an active and continuous long-term relationship-based international cooperation, rejuvenate and dynamically strengthen initial very successful collaboration between Indian SAUs and US Land Grant Universities, and launch need-based South-South and South-North collaborations such as the Brazilian LABEX programme of scientific exchange.

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Note: The designations and affiliations of the participants are as on date of BSS

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