

2nd Global Biofortification Conference

31 March 2014, Kigali, Rwanda

Biofortification and the Zero Hunger Challenge

Prof M S Swaminathan, FRS, FNA

1. **Commitment by Government of India:** At the moment, no specific commitment will be forthcoming since we are in the midst of an election. It is only after June 2014 that we can expect some firm commitments. Meanwhile we may cite the following two commitments on the part of the Government of India.

- a. **Launching a Nutri-Farm Movement:** Based on a suggestion made by Prof M S Swaminathan, the Finance Minister of the Government of India Mr P Chidambaram proposed a pilot programme on Nutri-Farms for introducing crop varieties that are rich in micro-nutrients such as iron rich *bajra* (pearl millet), protein rich maize and zinc rich wheat. The Finance Minister provided the equivalent of US \$ 40 million for this purpose during the year 2013-14 and suggested that agri business and farmers should come together to start a sufficient number of pilots in the districts most affected by malnutrition.
- b. The Government of India enacted a **Food Security Act in 2013** which confers a legal right to food to over 75% of India's population. According to this Act, every citizen will have access to 5 kg of either wheat or rice or nutri-cereals like pearl millet, ragi and other underutilized crops per person per month.

These two important steps will provide an opportunity for making good the deficiencies (quantitative and qualitative) in the diet of a poor person.

2. **Contribution of MSSRF:** MSSRF is hosting the Asia-Pacific Conference on the Year of family Farming in August this year jointly with FAO, IFAD, WFP, IDRC and CGIAR. At this Conference, it is proposed to get a resolution passed for seeking the commitment of every nation to include biofortified crops in the fight against malnutrition. The proposal will be to adopt a resolution involving the commitment of every nation to make **“Every Family Farm a Biofortified Farm”**.

3. The United Nations had declared 2013 as the International Year of Quinoa. 2014 has been designated as the International Year of Family Farms. 2016 will be commemorated as the International Year of Pulses. I have proposed that any year between 2018 to 20 should be declared as the **International Year of Underutilised and Biofortified Crops**. If this comes through, biofortification will receive international recognition as an important approach to overcoming hidden hunger and malnutrition. **The advantage of biofortification is that it addresses simultaneously issues of under nutrition and micronutrient malnutrition.**

4. MSSRF plans to establish a **Genetic Garden of Biofortified Crops and Varieties**. This Genetic Garden will serve as an important source of germplasm for developing countries to access naturally and genetically fortified crops. **The Genetic Garden of Biofortified Crops will be a unique one and a reference can be made to it in the Kigali Declaration.**

5. It is becoming increasingly clear that a purely drug based approach will not help those suffering from diseases like tuberculosis, HIV / AIDS etc. What they need is also nutrition support. Here again biofortified crops to meet the nutrition needs of TB and

HIV affected individuals would be a win-win both for nutrition and for enhancement of the efficiency of the drugs consumed.

The Second Global Biofortification Conference is an important turning point in the history of biofortification. There is widespread awareness of the need to overcome micronutrient malnutrition as well as under-nutrition among pregnant women and nursing mothers as well as young infants. The Kigali conference will therefore be a landmark in the history of the human quest for achieving the zero hunger challenge by 2025.

M S Swaminathan

23 March 2014

2nd Global Conference on Biofortification: Getting Nutritious Foods to People
Kigali Principles
DRAFT

The second Global Conference on Biofortification titled “Getting Nutritious Foods to People” was held in Kigali, Rwanda from March 31 – April 2 2014. Set up as a highly interactive global consultation, the Conference was officially hosted by the Government of the Republic of Rwanda and organised by HarvestPlus.

More than 250 leaders in agriculture, food, nutrition and health participated in this global gathering, it was informed by a comprehensive landscape assessment and multi-sector stakeholder interviews conducted in 2013. The purpose of the assessment and interviews was to understand perceptions and knowledge levels around biofortification.

Participants identified the most pressing gaps and challenges in increasing access to more nutritious-foods; and proposed how policies, programs and markets could be used to change this.

The Conference created a mechanism to engage new voices and perspectives that are critical to increasing access to more nutritious food crops. The following statements reflect the priorities and commitments by international leaders as we look at options to tackle hunger and malnutrition through a nutrition-sensitive agricultural lens.

We, the participants in the Kigali Consultation, agree that:

1. There is an acute need to improve the nutritional profile of food consumed in regions where malnutrition is rampant, with a focus on women and children, especially during the 1,000 Days window of opportunity.
2. Agricultural development and effective local food systems are the foundation for improved nutrition and health outcomes.
3. A range of complementary approaches is required to improve nutrition security. These include improvements in dietary diversity, biofortifying food crops, fortifying foods during or after processing, improving nutrient retention through altered processing and cooking techniques, and altering soil composition to increase nutrient levels of crops.

The recently published *Lancet* series, entitled “Maternal and Child Nutrition” (June 2013), cites the potential of nutrition-sensitive interventions such as biofortification to address under-nutrition through underlying factors that are the direct causes of vitamin and mineral deficiencies, such as poor quality diets.

We, the participants of the Kigali Consultation, call upon the following critical players:

1. National governments to join us in identifying how more nutritious food crops can be integrated into comprehensive efforts to improve food and nutrition security.
2. The private sector to integrate nutritious food crops into their activities:
 - Seed companies to develop nutrient-rich crops and make them widely available
 - Wholesalers, millers, retailers to market foods made from nutrient-rich varieties.
 - Food processing companies to evaluate and use nutrient-rich crops as ingredients in appropriate foods for children, women and the elderly, ready-to-use-therapeutic foods, and other processed foods in order to improve nutrition status of vulnerable populations.
3. International organizations to support dissemination of evidence and best practices, and inform the research community of additional evidence.
4. Research and academic institutions to continue to enhance the quantity and quality of nutrient-rich crops through plant breeding and to support in-country capacity development
5. Donor communities to support the expansion of existing crop varieties and continue to support collection of evidence on health and nutrition impact.

We, the participants of the Kigali Consultation have identified the following key activities of the critical players that will underpin a sustained integration of nutritious staple food crops into food systems in developing countries:

1. Demonstrate in multiple country settings that the development and delivery of nutrient-rich crops can be scaled, and have a significant and cost-effective public health impact.
2. Incorporate nutritious crops into the core activities of a range of stakeholders, including private businesses, national and international NGOs, bilateral and multilateral organisations and research institutions with the goal to reduce mineral and vitamin deficiencies.
3. Increase investments in crop development to expand the pipeline of nutritious varieties, and mainstream breeding for mineral and vitamin traits into conventional food crop development programs.
4. Develop enabling policy environments to sustain and mainstream the practice of biofortification into national and international research agendas.
5. Support nutrition research, focused on the 1,000 Days window, that expands the current evidence-base that nutrient-rich crop varieties can improve the mineral and vitamin status of children and mothers
6. Build a body of evidence that biofortification is a viable, cost-effective agriculture-based intervention to improve nutrition.

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CFS 40 7-11 October 2013
(Check contents against Final Session Report)

POLICY ROUNDTABLE:
BIOFUELS AND FOOD SECURITY

The Committee

Welcomes the work of the High Level Panel of Experts (HLPE) on Biofuels and Food Security and the relevant report.

Recalls the outcomes of the Committee's deliberations on 'Food Price Volatility' in October 2011, in particular CFS 37 Final report paragraph 50 i).

Highlights that energy and food security are linked and acknowledges the challenge of achieving both food security and energy security, considering the four dimensions of food security (availability, access, stability and utilization).

Takes note of the various drivers of biofuel development including energy security, climate change mitigation, export markets development, and rural development.

Recognises that biofuel development encompasses both opportunities and risks in economic, social and environmental aspects, depending on context and practices.

Underscores that food security and the progressive realization of the right to adequate food in the context of national food security should be priority concerns for all the relevant stakeholders in biofuel development, which should not compromise food security, and should especially consider women and smallholders due to their high level of importance in achieving food security, while considering varied national contexts.

Acknowledges that

- The links between biofuels and food security are multiple and complex and can occur in different ways at different geographic levels (local, national, regional, global) and time scales. Therefore, their assessment should be multi-faceted and contextualised, and an integrated, evidence-based, gender-sensitive and environmentally-sound approach is required in biofuel policy-making and investments;
- Production and consumption of biofuels, amongst many other factors, influence international agricultural commodity prices. The interaction between biofuels, food prices and supply responses is dynamic and complex, and requires a distinction between short-term and long-term impacts;
- In some cases, current biofuel production creates competition between biofuel crops and food crops. Significant guidance exists and is further needed to ensure that biofuels policies are coherent with food security to minimize the risks and maximize the opportunities of biofuels in relation to food security. This includes, the CFS Global Strategic Framework for Food Security and Nutrition (GSF), the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests in The Context of National Food Security (VGGT), the Voluntary Guidelines for the progressive realization of the right to adequate food in the context of national food security, The Global Bioenergy Partnership (GBEP) Sustainability Indicators for Bioenergy and FAO Bioenergy and Food Security (BEFS) Approach.

Stresses the importance of concerted international and national actions to encourage that biofuel development and policies are in line with the objective to eradicate hunger, food insecurity and malnutrition, and contributes to sustainable rural development, including respecting legitimate land tenure rights, and poverty reduction, bearing in mind varied national contexts.

Encourages governments to seek coordination of their respective food security and energy security strategies, giving due consideration to the sustainable management of natural resources.

Recommends the following action points, their development and implementation, by the appropriate stakeholders.

1. Actions towards enhanced policy coherence for food security and biofuels

- a. Governments, FAO, AMIS, GBEP, IFPRI and other international organizations are encouraged to regularly share with CFS the results of their work on biofuels-food security linkages.
- b. Governments, FAO, and all other relevant stakeholders are encouraged to promote and facilitate exchange of information and cooperation on biofuels and food security links. This includes analysis, assessments and projections as well as providing transparent information on assumptions, methods, tools and gender-disaggregated data.
- c. Governments and other stakeholders are encouraged to implement policies and investments for the production of biofuels and food in accordance with national development strategies and multilateral agreements applicable to food security. Special attention should also be given to the situation of vulnerable groups and small scale food producers.
- d. Governments and other appropriate stakeholders are encouraged to review biofuels policies - where applicable and if necessary - according to balanced science-based assessments of the opportunities and risks they may present for food security, and so that biofuels can be produced according to the three pillars of sustainable development.
- e. FAO is invited to inform CFS of the progress made in building capacities in member states with respect to biofuel policies in coherence with food security and initiatives on biofuel policies at multiple levels. This would be based on existing works and material e.g. the GBEP sustainable bioenergy indicators, the FAO BEFS Approach; as well as the Voluntary Guidelines on Governance of Tenure/VGGT, which governments and all stakeholders are encouraged to promote, make use of and to support their implementation.
- f. FAO, in collaboration with relevant stakeholders and in consultation with member states as appropriate, is invited to propose a programme of work aimed at strengthening the capacity of interested countries and operators to assess their situation with regards to biofuels, taking into account food security concerns at global, regional and national levels, legitimate land tenure rights, to manage the related risks and opportunities, and to monitor impacts. This could take advantage of the GBEP capacity building programme.

2. Actions to promote Research and Development (R&D) on biofuels and food security

- a. Food security, smallholder and gender concerns should be integrated as appropriate in the design, monitoring and evaluation of R&D on biofuels. R&D is important in improving the efficiency of biofuels regarding both resources and processes, and in exploring new technologies including biofuels of the second and third generations. Research partners are encouraged to devise solutions adapted to the needs of all stakeholders, especially those in least-developed countries and of women and smallholders who are most in need of access to modern energy services.
- b. International cooperation (including south-south cooperation), and public sector, and public-private partnerships have an important role to play in supporting these research topics. It is important to ensure that lessons learned from these partnerships are reflected in future cooperation.

POLICY ROUNDTABLE:
INVESTING IN SMALLHOLDER AGRICULTURE
FOR FOOD SECURITY AND NUTRITION

The Committee:

Welcomes the work of the High Level Panel of Experts (HLPE) on “Investing in Smallholder Agriculture for Food Security “ and the relevant report, and acknowledges its findings as an important contribution to the CFS recommendations.

Recalls the report on the Committee’s deliberations on ‘How to increase food security and smallholder-sensitive investment in agriculture’ during its 37 session in October 2011, particularly the acknowledgement that smallholder farmers, many of whom are women, play a central role for food security locally and worldwide. They are the main investors in their own agriculture. Smallholder agriculture contributes to a range of other benefits such as helping to maintain employment, reduce poverty, and enhance the sustainable management of natural resources.

In order to address constraints on investment in smallholder agriculture in general, with, special attention to those faced by women and youth, and thereby improve food security and nutrition, the CFS encourages governments, together with smallholder organizations and other national and international stakeholders (civil society, local organisations, private sector, research institutions and international development partners), to:

Enable national policies, governance and their evidence base:

1. Build or further develop a country-owned vision for smallholder agriculture, in the context of broad-based national, and agricultural development, that positions smallholder agriculture firmly within integrated policies and strategies, that includes connecting smallholders to markets, that is articulated together with all national stakeholders, especially smallholder farmers, of whom women represent a majority in many countries, their organisations and their representatives, in the context of sustainable development and transparent rights-based processes and guidelines.
2. Guided by this vision and the Voluntary Guidelines on the Progressive Realization of the Right to Adequate Food in the Context of National Food Security, consider revisiting agricultural, urban and rural sector policies, strategies and budgets, with particular attention to enabling smallholder access - especially for women - to productive assets, local, national and regional markets, appropriate training, research, technology and farm support services.
3. Support the review, financing and implementation of smallholder inclusive, gender-sensitive, multi-sectoral, policies and strategies linked to sustainable agricultural development, with a particular supporting role by international development partners and especially IFAD, FAO and WFP, the World Bank, bilateral funding agencies and regional development banks.
4. Mainstream gender equality and women’s empowerment within the country-led vision and strategy for agricultural development. In addition, encourage gender specific support services in view of the critical role of women and to address the specific needs and constraints faced by both women and men smallholder farmers

5. Address constraints to engaging young women and men in smallholder agriculture, as well as in related non-farm rural sectors, through targeted policy interventions. These include strengthening and ensuring equal access to education and training systems.

6. Explore geographically inclusive territorial development as an approach to effectively coordinate cross-sectoral public and private investments, in particular in smallholder agriculture as well as in the non-farm economy.

7. Improve governance for agriculture and rural development through a coordinated multi-sectoral approach, with particular focus on smallholder agriculture, ensuring adequate participation of all relevant organisations, especially those representing smallholder farmers. This involves developing context-specific solutions for smallholder-sensitive public and private investments. Consider experiences such as the Comprehensive African Agricultural Development Programme (CAADP), the Global Agriculture and Food Security Programme (GAFSP) and others.

8. Build inclusive participatory processes that engage smallholders, women, youth, private sector, and other relevant organizations. Promote legal recognition and respect of the rights of smallholder farmers - including the right to organize democratically and to have voice in policy debates, with gender- and age-balanced representation - and the need for farmers' organizations to be strengthened to achieve this.

9. Improve information management (the collection, transparency, communication and access to data, including sex-disaggregated data). Step-up evidence-based analyses to document the state of smallholder agriculture; its diverse typologies, its incentives and constraints, its evolution and its contributions to various outcomes in particular to food security and nutrition.

Promote access to assets, public goods, social services, research and extension and technology

Access to assets

10. Note farmers' and breeders' contribution to conserving and developing plant genetic resources for food and agriculture. Promote smallholders', particularly women farmers', ability to access, breed, produce, conserve, purchase, exchange, sell and use the seeds they need, including local, indigenous and modern varieties. Strengthen information and knowledge sharing related to practical on-farm implementation and foster local innovation. Support *in situ* and *ex situ* conservation and development of agricultural biodiversity by smallholders together with research and extension systems, in line with sustainable agricultural development and good practices, including through agro-ecological approaches and sustainable intensification. All the above mentioned measures of this paragraph have to be in accordance with applicable national and international law.

11. Strongly promote responsible governance of land and natural resources with emphasis on securing access and tenure for smallholders, particularly women, in accordance with the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests as well as other country-led measures with similar objectives. Solutions need to be country and context specific and consistent with existing obligations under national and international law. A related need is to strengthen local institutions dealing with regulation of such access and use of natural resources, particularly by smallholders and women.

Access to public goods, social services, research, extension and technology

12. Prioritize public investment and encourage private investment, specifically in support of smallholders' own investments, in, among others; water management, sustainable management of genetic resources for food and agriculture, soil conservation, forests, transport and infrastructure such as feeder roads, energy, post-harvest handling infrastructure, rural electrification and telecommunication grids.

13. Provide gender-sensitive public investment, and encourage private investments, in health-care, child care, nutrition, education and capacity development, social protection, water and sanitation, to enhance food security and nutrition, and reduce smallholder poverty.

14. Strengthen participatory research, extension and farming service systems, particularly those that respond to the specific needs of smallholders, and women farmers, to increase their productivity, diversify their production, and enhance its nutritional value and build their resilience, including with respect to climate change, according to the tenets of sustainable development. The approach is ideally that of combining farmers' and indigenous people's traditional knowledge with the findings of scientific research, as appropriate.

15. Promote access to available technologies that help improve the quality of smallholders' production. Take into consideration the specific constraints of smallholders in relation to sanitary and phyto-sanitary regulations and enable their access to the programs and supplies needed for compliance.

Enable investment, access to markets, productive services and resources

16. **Promote investment of and for smallholders.** Improve policies, markets and institutions to foster economic opportunities for smallholders. Mitigate excessive price volatility and non-transferable smallholder risks using public policy instruments in accordance with international commitments. Develop and/or improve value chains and enable smallholders to be full participants in the value chains of their choice. Ensure legal and fair business practices amongst all parties and increase the negotiating capacity of smallholders. This calls for continued development of policy measures and technical guidelines and tools, including for contract farming and public-private partnerships, in consultation with smallholder organisations, the expertise of relevant UN organizations and other centres of expertise.

17. **Access to markets.** Support, in accordance with international commitments, the development of, and access to, markets, distribution and marketing systems and mechanisms that are remunerative for smallholders and rural economies. Recognise the importance of non-monetary exchanges of products and services, the importance of local food systems for smallholders including their potential for supplying school and institutional feeding programmes. Create appropriate linkages and engage smallholder farmers, men and women, along value-chains, especially in local, national and regional markets. Enable and stimulate cooperation between smallholders, for instance, via cooperatives or other approaches for market organisation that benefit smallholders in accordance with international commitments.

18. **Financial services.** Improve regulatory conditions and financial infrastructure to strengthen smallholder access to a full range of financial services adapted to their needs, with attention to the particular challenges faced by women and youth in this regard. Relevant financial services include safe deposits, monetary transactions and remittances, mobile financial services, sustainable micro, short and long-term credit, public insurance schemes (including indexed insurance), commodity exchange and warehouse receipt systems. Reduce financial risks, lower transaction costs and facilitate long-term investments, – such as for field operations equipment, food processing and other value-adding activities on smallholder farms. As appropriate, relax liquidity constraints on working capital expenditures (e.g. fertilizers, seeds) as well as on medium- and long-term investments while avoid worsening smallholder farmers' debt burden. Support such measures by appropriately designed, well-targeted fiscal measures. All the above mentioned measures of this paragraph should be implemented in accordance with international commitments.

19. **Investing beyond the farm.** Promote public investment and encourage private investment to develop a decentralised, rural, non-farm economy to support smallholders' access to alternative sources of income, thereby further consolidating the farming economy and contributing to improved food security and nutrition. This encompasses investment in capacity building and entrepreneurship development, where appropriate and particularly targeting young women and men, for employment in a modernized agriculture as well as in other related activities and labour markets. It also requires promoting investment for new business development.

Furthermore the Committee:

20. Encourages stakeholders to share their experiences in using these recommendations in their national context at the High Level Forum on “Connecting Smallholders to Market”, planned in the MYPOW for 2015. In general, encourages promoting international cooperation and sharing of experience in smallholder development across the world, with strong engagement and leadership of smallholder organizations.

21. Invites its members and stakeholders to disseminate the findings of the HLPE Report and the present recommendations to relevant fora and processes such as: the implementation of the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests and the principles for responsible agricultural investments (rai); the 2014 International Year of Family Farming, the Right-to-Food plus 10, the post-2015 agenda.

- c. R&D, as appropriate, should strengthen capabilities to adapt biofuel production and processing units so that they can modulate their supply chain between food, feed and energy

3. Actions with regard to linkages between energy and food security

- a. Stakeholders are encouraged to support more energy and other resource use efficiency, increased use of sources of renewable energy and improved access to sustainable energy services, including among others in agrifood chains, according to each country's specificities.
- b. Governments and operators should support the participation of farmers, in particular smallholders and women, in food-energy security programmes (including on biofuel production and consumption), as appropriate on the basis of fair and equitable conditions
- c. CFS encourages public and private sectors to support the integration of sustainable biofuel production into agricultural and forestry policies, according to each country's specificities

Dr Madhura Swaminathan

08 Jul

SG 3264 (from Kochi)

11:05 AM

Presidents' Address

Political views

to
Congress

Railway Budget

Public Cost Organisation
among the parties to be

General Budget

Resource allocation
for meeting the programme
proposed with reference to the
President's address

Ashia

Nitya

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Salmi Doctore

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Budget - Union
foundations are Presidents'
address to Parliament
& Economic Survey
(Political comment +
state of nation's economy.

Railway Budget - India
Sustaining Public Good services

**ADDRESS BY THE PRESIDENT OF INDIA, SHRI PRANAB MUKHERJEE
TO PARLIAMENT**

Central Hall of Parliament, New Delhi: 09-06-2014

Honourable Members

I am delighted to address this first session of both Houses of Parliament after the elections to the 16th Lok Sabha. Let me begin by extending warm greetings to my fellow citizens, who participated in large numbers in the recently concluded Lok Sabha elections. We should never forget that we are here because of them. **Serving them should be our first priority.** I also felicitate the members of the new Lok Sabha. You have successfully obtained the mandate from the electorate and now you represent their hopes, aspirations and dreams. I extend a warm welcome to all of you and hope that the sessions ahead with heavy legislative agenda will be productive and useful.

2. It is a matter of great satisfaction that the recent general elections were smooth and largely peaceful. I would like to congratulate the Election Commission of India and the official machinery for conducting these elections successfully. The unprecedented interest shown by the people of India in the elections is a sign of progressive deepening of our vibrant democracy. Before I dwell upon the tasks ahead of us, I would like to express my solidarity with the families of all those who lost their lives during the election process.

3. I congratulate the new Speaker of the Lok Sabha on her unanimous election to this august office. By successively electing women Speakers, the Lok Sabha has re-affirmed our age-old belief in the importance of women in our society.

Honourable Members

*If special time goes wrong,
nothing else will
have a chance to
go right*

4. This has been an election of **Hope**. It marks a turning point in the evolution of our democratic polity. The surge in aspirations and the belief that these could be realized through democratic processes, has been amply reflected in the record 66.4% participation by voters, and a clear verdict in favour of a single political party after a gap of nearly 30 years. The electorate transcended the boundaries of caste, creed, region and religion to come together and vote decisively in favour of **Development through Good Governance**.

5. The country needed a strong and stable government that could provide effective leadership. In my Republic Day speech earlier this year, I had hoped for 2014 to be a year of healing after the fractured and contentious politics of the previous years. Standing here today, I applaud the wisdom of my fellow citizens for having voted for stability, honesty and development in a resurgent India in which corruption will have no place. They have voted for a united, strong, and modern India - "**Ek Bharat - Shreshtha Bharat**". My government will work to fulfill these aspirations; with the involvement of all the 125 crore people of this great country.

6. My government is committed to nurturing the right environment for actualizing this mandate of the people. For this, it pledges itself to the principle of '**Sabka Saath, Sabka Vikas**'; which can be fulfilled only through your active participation. **We will work together to** re-establish the credibility of the institutions of democracy. My government will function on the mantra of '**Minimum Government, Maximum Governance**'. In all our actions, we will be guided by the core values of our great civilization.

Honourable Members

7. **My Government is dedicated to the poor.** Poverty has no religion, hunger has no creed, and despair has no geography. The greatest

Poverty: No assets
Landless labour families

³ Assets - land, livestock
& skills

challenge before us is to end the curse of poverty in India. My government will not be satisfied with mere "poverty alleviation"; and commits itself to the goal of "poverty elimination". With a firm belief that the first claim on development belongs to the poor; the government will focus its attention on those who need the basic necessities of life most urgently. It will take necessary steps to provide security in its entirety to all citizens; through empathy, support and empowerment.

8. Containing food inflation will be the topmost priority for my government. There would be an emphasis on improving the supply side of various agro and agro-based products. My government will take effective steps to prevent hoarding and black marketing. It will reform the Public Distribution System, incorporating best practices from the States. My government is alert about the possibility of a subnormal monsoon this year and contingency plans are being prepared.

Maximizing the benefits of a good monsoon

9. Despite more than two-thirds of our people living in rural areas; we have not been able to provide adequate public amenities and livelihood opportunities to them. My government is committed to improving the quality of life in our villages, through empowered Panchayati Raj institutions. A substantial part of investment will focus on creating community assets and improving basic infrastructure such as roads, shelter, power and drinking water. My government will strive to end the rural-urban divide guided by the idea of **Rurban**; providing urban amenities to rural areas while preserving the ethos of the villages.

Agriculture is a livelihood industry, not just a food producing machine

10. Agriculture is the source of livelihood for majority of our people. In the recent past, our farmers have been under severe stress with hopelessness driving some of them to suicides. My government is committed to reversing this unfortunate trend. It will increase investment in agriculture, both public

and private, especially in **Agri-infrastructure**. Steps will be taken to convert farming into a profitable venture through scientific practices and **Agro-technology**. My government will address issues pertaining to pricing and procurement of agricultural produce, crop insurance and post-harvest management. Productivity of Animal Husbandry will be increased. My government will incentivize the setting up of food processing industries. Existing cooperative sector laws will be reviewed to remove anomalies and lacunae. My government will adopt a National Land Use Policy which will facilitate scientific identification of non-cultivable land and its strategic development.

11. Each drop of water is precious. My government is committed to giving high priority to water security. It will complete the long pending irrigation projects on priority and launch the 'Pradhan Mantri Krishi Sinchayee Yojana' with the motto of 'Har Khet Ko Paani'. There is a need for seriously considering all options including linking of rivers, where feasible; for ensuring optimal use of our water resources to prevent the recurrence of floods and drought. By harnessing rain water through 'Jal Sanchay' and 'Jal Sinchan', we will nurture water conservation and ground water recharge. Micro irrigation will be popularised to ensure 'Per drop-More crop'.

Honourable Members

12. India is the world's oldest civilization. Today it is also a country with the largest population of the youth. We must equip and nurture our youth with the right kind of education, skill-set and opportunity to reap this demographic dividend. My government will strive to transition from Youth Development to Youth-led Development. It will set up Massive Open Online Courses and virtual classrooms. It will formulate a National Education Policy aimed at meeting the challenges posed by lack of quality,

research and innovation in our educational institutions. We will set up IITs and IIMs in every state. In order to empower school teachers and students, a national e-library will be established. With the motto of “**Har Haath Ko Hunar**”, my government will strive to break the barriers between formal education and skill development, and put in place a mechanism to give academic equivalence to vocational qualifications. With the goal of **Skilled India**, my government will also launch a National Multi-skill Mission.

13. The children and youth of the country need avenues of recreation that develop them constructively and keep them fit. My government will launch a ‘**National Sports Talent Search System**’. It will facilitate development and promotion of Indian sports, particularly rural sports. Sports will be popularised by making it an integral part of the school curriculum and providing educational incentives.

14. Our country needs a holistic health care system that is universally accessible, affordable and effective. To achieve this objective, my government will formulate a **New Health Policy** and roll out a **National Health Assurance Mission**. It will promote Yoga and AYUSH. To address the shortfall of health care professionals, health education and training will be transformed. AIIMS like institutes will be established in every State in a phased manner.

15. We must not tolerate the indignity of homes without toilets and public spaces littered with garbage. For ensuring hygiene, waste management and sanitation across the nation a “**Swachh Bharat Mission**” will be launched. This will be our tribute to Mahatma Gandhi on his 150th birth anniversary to be celebrated in the year 2019.

16. Keeping in mind welfare of the people belonging to the Scheduled Castes, Scheduled Tribes, Other Backward Classes and the weaker sections of our society; my government will take steps to create an

enabling eco-system of equal opportunity in education, health and livelihood. My Government is committed to see that those belonging to the Scheduled Castes and Other Backward Classes are able to avail emerging opportunities. For the Scheduled Tribes, my government will launch a dedicated “**Van Bandhu Kalyan Yojana**”. Electrification of tribal hamlets and connecting them with all-weather roads will be a priority area.

17. It is unfortunate that even after several decades of independence, sections of minority communities continue to suffer from poverty, as benefits of government schemes do not reach them. My government is committed to making all minorities equal partners in India’s progress. The government will especially strengthen measures to spread modern and technical education among minority communities and a National Madarsa Modernization Programme will be initiated.

18. The welfare and rehabilitation of specially-abled people is integral to my government’s vision of a caring society. It will take steps to provide dignity of life to them by facilitating their participation in all walks of life. Steps will be taken to identify their special needs and to provide institutional care to them.

19. My government recognizes the important role our women play in the development of our society and growth of the nation. It is committed to providing 33 per cent reservation to them in the Parliament and State Legislative Assemblies. With a commitment of “**Beti Bachao - Beti Padhao**”, my government will launch a mass campaign for saving the girl child and enabling her education. It will structure a comprehensive scheme, incorporating best practices from States in this regard. In the recent past, the country has witnessed some gruesome incidents of violence against women. The government will have a policy of **zero tolerance** for violence

against women, and will strengthen the criminal justice system for its effective implementation.

Honourable Members

20. India is a federal polity. But, over the years, the federal spirit has been diluted. The States and the Centre should function as an organic **Team India**. In order to actively engage with the States on national issues, my government will reinvigorate fora like the National Development Council and the Inter-State Council. The Centre will be an enabler in the rapid progress of States through **Cooperative Federalism**. State-specific development models will be developed taking into account the special needs and unique problems of Coastal, Hilly and Desert areas. Highest priority will be accorded to bring eastern region of the country on par with western region in terms of physical and social infrastructure. My government is committed to addressing the issues relating to development of Andhra Pradesh and Telangana. The government will lay special emphasis on improving the intra-region connectivity and border infrastructure in the Northeast as well as in Jammu & Kashmir. The issue of infiltration and illegal immigrants in the Northeast region will be tackled on priority and all pending fencing work along the Northeast border will be completed. Special efforts will be made to ensure that Kashmiri Pandits return to the land of their ancestors with full dignity, security and assured livelihood.

21. My government is committed to providing a clean and efficient administration focussed on delivery. The institution of Lok Pal is important to curb corruption and my government will endeavour to formulate rules in conformity with the Act. My government will take steps to build the confidence and morale of our bureaucracy; enabling it with the freedom to work, and welcoming innovative ideas. The government will stress on putting in place transparent systems and timebound delivery of government services. Government systems and processes will be revisited to make

them citizen friendly, corruption free and accountable. Efforts will be made to eliminate obsolete laws, regulations, administrative structures and practices. Rationalization and **convergence** among Ministries, Departments and other arms of the government will be ensured to have focussed delivery. **Digitization** of government records will be done for improving accessibility.

22. **E-governance brings empowerment, equity and efficiency.** It has the power to transform peoples' lives. The backbone of my government's new ways of working will be a **Digital India**. IT will be used to drive re-engineering of government processes to improve service delivery and programme implementation. We will strive to provide Wi-Fi zones in critical public areas in the next five years. My government will rollout broad band highway to reach every village and make **all schools e-enabled** in a phased manner. Technology will be used to prepare our children for a knowledge society. The National e-governance plan will be expanded to cover every government office from the centre to the Panchayat; to provide a wide variety of services to citizens. Emerging technologies like **Social Media** will be used as a tool for, **participative governance**, directly engaging the people in policy making and administration.

23. My government is determined to rid the country of the scourge of corruption and the menace of black money. As a first step in this direction, the government has already constituted a SIT to unearth black money stashed abroad. This will be followed up vigorously by proactively engaging with foreign governments.

24. Keeping in mind that **justice delayed is justice denied**, my government will adopt a multi-pronged approach to address the problem of high pendency of cases in our judicial system. It will progressively modernize the courts to improve their operational efficiency, and start reform of the criminal justice system to make

dispensation of justice simpler, quicker and more effective. It will initiate a mission mode project for filling vacancies in the judiciary and for doubling the number of courts and judges in the subordinate judiciary in a phased manner. The government will give special emphasis to the development of Alternate Dispute Resolution mechanisms.

Honourable Members

25. On the economic front, we are passing through an extremely difficult phase. For two consecutive years, our GDP growth has been less than 5 per cent. Tax collection has declined. Inflation continues to be at an unacceptable level. Thus, putting the Indian economy back on track is paramount for my government. We will work together to usher our economy into a high growth path, rein in inflation, reignite the investment cycle, accelerate job creation and restore the confidence of the domestic as well as international community in our economy.

26. My government will create a policy environment which is **predictable, transparent and fair**. It will embark on rationalisation and simplification of the tax regime to make it non-adversarial and conducive to investment, enterprise and growth. My government will make every effort to introduce the GST while addressing the concerns of States. Reforms will be undertaken to enhance the **ease of doing business**. My government will follow a policy of encouraging investments, including through FDI; which will be allowed in sectors that help create jobs and assets.

27. For rapid creation of jobs in the manufacturing sector, the government will strategically promote **labour-intensive manufacturing**. Employment opportunities will also be expanded by promoting tourism and agro-based industries. My government will transform Employment Exchanges into **Career Centres** - connecting our youth with job opportunities in a transparent and effective manner

through the use of technology as well as through counselling and training. The government will strengthen the pension and health insurance safety nets for labour force of all categories and would provide them access to modern financial services.

28. We need to transform ourselves into a globally competitive manufacturing hub powered by **Skill, Scale and Speed**. To this end, the government will set up **world class investment and industrial regions**, particularly along the **Dedicated Freight Corridors and Industrial Corridors** spanning the country. My Government will encourage the domestic industry to innovate and collaborate internationally. It will strive to move towards a single-window system of clearances both at the Centre and at the States through a hub-spoke model.

29. To strengthen our share in global trade, procedures will be simplified and trade infrastructure strengthened so as to reduce transaction time and costs. The SSI and Handicraft sectors will be encouraged by providing them enhanced technological, marketing and investment support. Export potential of this sector will be encouraged. My government will make every effort to improve the working conditions of our weavers in particular. It will also set up a task force to review and revive our MSME sector.

Honourable Members

30. Lack of robust infrastructure is one of India's major impediments. The government will chalk out an ambitious infrastructure development programme to be implemented in the next 10 years. A fast-track, investment friendly and predictable PPP mechanism will be put in place. Modernization and revamping of Railways is on top of the infrastructure agenda. My government will launch a Diamond Quadrilateral project of **high speed trains**. The country will have a network of freight corridors with specialised **Agri-Rail networks** for perishable agricultural products. Investment in railways will be increased using innovative financing

Very imp. Transport & Infra. Dev.

methods. Expansion of railways in Hilly States and Northeast region and modernization of rail safety systems will be prime focus areas. We will encourage R&D and high level local manufacturing for railway systems. A fast, time-bound and well monitored programme for execution of the National Highways programme will be initiated, to overcome the stagnancy of the past few years. Low cost airports will be developed to promote air connectivity to smaller towns. The government will evolve a model of **Port-led development**. Our long coastline will become the **gateway for India's prosperity**. My government will facilitate modernization of existing ports on one hand, and development of new **world class ports** on the other. Stringing together the **Sagar Mala** project we will connect the ports with the hinterland through road and rail. Inland and coastal **waterways** will be developed as major transport routes.

31. My government will come out with a comprehensive **National Energy Policy** and focus on development of energy related infrastructure, human resource and technology. The aim of the government will be to substantially augment electricity generation capacity through judicious mix of conventional and non-conventional sources. It will expand the national solar mission and connect households and industries with gas-grids. Reforms in the coal sector will be pursued with urgency for attracting private investment in a transparent manner. The international civil nuclear agreements will be operationalized and nuclear power projects for civilian purposes will be developed.

32. My government is conscious of the fact that our urban infrastructure is under severe stress. Soon, 50 per cent of our population would be residing in urban areas. Taking urbanization as an opportunity rather than a challenge, the government will build **100 Cities** focussed on specialized domains and equipped with world class amenities. Integrated infrastructure

will be rolled out in model towns to focus on cleanliness and sanitation. By the time the nation completes 75 years of its Independence, **every family will have a pucca house** with water connection, toilet facilities, 24x7 electricity supply and access.

Honourable Members

33. While putting the country on a high growth path, my government will keep sustainability at the core of our planning process. My government strongly believes that environmental conservation can go hand in hand with development. To achieve this, environment and forest clearance systems will be made more predictable, transparent and time-bound. Simultaneously, an effective system will be developed for sound appraisal processes and strict compliance of clearance conditions, especially those relating to rehabilitation of displaced communities and regeneration of forests. **Cleaner fuels** will be promoted to bring down pollution levels in our cities. The government will earnestly take up mitigation works to meet the challenges posed by climate change and will closely work with the global community in this regard. Conservation of Himalayan ecology will be a priority area for my government. **A National Mission on Himalayas** will be launched.

34. In the recent past, serious concerns have been expressed regarding use of discretionary powers in allocation of our precious natural resources. The government will formulate clear and transparent **policies** on allocation of critical natural resources such as coal, minerals and spectrum.

35. **River Ganga** is a part of our rich cultural heritage, a symbol of faith and the lifeline for millions. However, Ganga continues to remain polluted with many stretches of the river becoming dry in lean season. My

government will take all necessary steps to ensure a perennial, clean and pristine Ganga.

36. Our rich cultural heritage is the very foundation on which rests the unity of our diverse nation. Indian languages are repositories of our rich literature, history, culture, art and other achievements. My government will launch a national mission "**e-Bhasha**" that will develop digital vernacular content and disseminate our classic literature in different languages. My government will also provide the required resources for the maintenance and restoration of national heritage sites.

37. India has a vast untapped potential for tourism which can play a special role in our socio-economic progress. The government will initiate a mission mode project to create **50 tourist circuits** that are built around specific themes. With a view to encouraging **pilgrimage tourism**, a National Mission for beautifying and improving the amenities and infrastructure at pilgrimage centres of all faiths will be launched.

38. My government recognises the central role of Science and Technology in raising the quality of life. It will encourage and incentivise private sector investments, both domestic and foreign, in science and technology and in high-end research aimed at nurturing innovation. My government will build world class research centres in the fields of nanotechnology, material sciences, thorium technology, brain research, stem cells, etc. The government will also establish institutes of Technology for Rural Development and a **Central University of Himalayan Studies**.

Honourable Members

39. The government will maintain utmost vigil in the area of internal security. A policy of **zero tolerance towards terrorism, extremism, riots and crime** will be pursued. The States will be assisted for modernizing

police infrastructure and equipment to tackle new forms of terrorism including **narco terrorism** and **cyber threats**. A national plan will be chalked out in consultation with the state governments to effectively curb incidents of communal violence and the challenges posed by left wing extremism. My government will take steps to equip the security forces with the latest technology and to improve their working conditions.

40. My Government will carry out reforms in defence procurement to increase efficiency and economy. It will encourage domestic industry, including the private sector; to have a larger share in design and production of defence equipment. We will introduce policies to strengthen **technology transfer**, including through liberalised FDI in defence production. With readily available skilled human resource, India can emerge as a global platform for defence manufacturing including software, which will strengthen our defence and spur industrial development as well as exports.

41. The country is proud of its Armed Forces. They serve the nation with professionalism, dedication and valour; securing our nation and supporting relief and rescue operations in the wake of disasters and calamities. We will strengthen defence preparedness by modernising our Armed Forces and addressing the shortage of manpower on priority. Recognising the importance of coastal security, my government will set up a **National Maritime Authority**.

42. My government will do everything to repay the debt of our brave and selfless soldiers. It will appoint a Veterans Commission to address their grievances, so that they know that we don't stop caring for them when they retire from active service. The government will build a **National War Memorial** to honour the gallantry of our soldiers. **One Rank, One Pension** scheme will be implemented.

Honourable Members

43. India's foreign policy, with its civilizational roots and heritage, is based on the principles of developing peaceful and friendly relations with all countries. We will pursue our international engagement based on enlightened national interest, combining the strength of our values with pragmatism, leading to a doctrine of mutually beneficial relationships. My government is committed to building **a strong, self-reliant and self-confident India**; regaining its rightful place in the comity of nations.

44. My government sent a unique and bold signal to the South Asian region and the world, by inviting for the first time in independent India, leaders of all South Asian neighbours to the swearing-in ceremony of the new Council of Ministers on May 26. We are grateful to them for accepting the invitation at such a short notice. Their participation, as also the gracious presence of the Prime Minister of Mauritius; not only added sheen to the ceremony, but also represented a celebration of democracy in the region and convergence of our shared hopes and aspirations. This shows my government's commitment and determination to work towards building a **peaceful, stable and economically inter-linked neighbourhood** which is essential for the collective development and prosperity of the South Asian Region. We will further work together with South Asian leaders to revitalise **SAARC** as an effective instrument for regional cooperation and as a united voice on global issues.

45. At the same time, we will never shy away from raising issues of concern to us at a bilateral level. We emphasize that the future of shared prosperity can only be built on the foundation of stability in the region, which requires sensitivity to security concerns and an end to export of terrorism to neighbours.

46. My Government will engage energetically with other neighbours in our region, including China, with whom we will work to further develop our Strategic and Cooperative Partnership. We will strive to make progress in the many initiatives that are ongoing with Japan, especially in the field of building modern infrastructure in our country. Russia remains a privileged and strategic partner and my government will build further on the firm foundations of this relationship.

47. India and the United States have made significant progress in developing strategic partnership over the years. My government will bring a renewed vigour to our engagement and intensify it in all areas, including trade, investment, science and technology, energy and education. India also values its broad-based cooperation with Europe. The government will make concerted efforts to achieve progress in key areas with the European Union as well as its leading members.

48. To fully realize our **softpower** potential; there is a need to integrate it into our external interchange, with particular emphasis on our rich spiritual, cultural and philosophical heritage. The government will revive **Brand India** riding on our strengths of 5T's: Tradition, Talent, Tourism, Trade and Technology.

49. Across the world, we have a vibrant, talented and industrious Indian Diaspora that is a source of great pride for us. They have done pioneering work in diverse fields, held the highest public offices and have worked hard to support their localities and families in India. While they have contributed immensely to their adopted country, they also carry a **little flame of India** in their hearts that can light up the promise of change in our country. A hundred years ago, in 1915, India's greatest Pravasi Bharatiya, Mahatma Gandhi, returned home and transformed the nation's destiny. The next

Pravasi Bharatiya Diwas in January 2015 will thus be a special occasion. As we celebrate the centenary of Gandhiji's return to India, we would also take steps that would deepen every Pravasi Bharatiya's connection with India and involve them in India's development.

Honourable Members

50. The people of India have given a clear mandate. They want to see a vibrant, dynamic and prosperous India. They want to see a resurgent India regaining the admiration and respect of the international community. Brimming with hope and expectation, they want quick results. With **three Ds of Democracy, Demography and Demand** on our side, India is poised to actualize these aspirations. We must rise to the occasion to fulfill these great expectations. In 60 months from now, we should be able to say with confidence and pride that we have done it.

Jai Hind

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Economic Survey urges strong steps to contain fiscal deficit

Wed, Jul 9 2014

By Manoj Kumar

NEW DELHI (Reuters) - India's fiscal situation is worse than it appears, Prime Minister Narendra Modi's government said in an economic report on Wednesday that called for tough measures to shore up public finances and reduce inflation.

The report's tone will increase speculation that Finance Minister Arun Jaitley, in presenting his first budget to parliament on Thursday, will give a higher, more realistic fiscal deficit target for this fiscal year than the 4.1 percent of gross domestic product the previous government set.

India risks losing its investment-grade sovereign rating if it fails to get its finances into shape. Many economists believe the last government's accounting understated the size of the deficit, and Jaitley will need to present a credible recovery plan to keep the ratings agencies onside.

The newly-released Economic Survey "shows the gravity of the economic situation that needs correction," Jaitley told reporters after ceremonially placing the report on a table in parliament.

"Inflation needs to be moderated further. The fiscal deficit needs downward correction over the next two years," the former corporate lawyer and career politician said.

An annual exercise, the Economic Survey is drawn up by finance ministry advisers and delivered the day before the federal budget.

Seen as a blueprint for the government's medium-term economic planning, the report forecast GDP growth of between 5.4 and 5.9 percent in 2014/15. It warned that weak monsoon rains, which are essential for farming, could keep growth closer to 5.4 percent.

In June, India's central bank forecast growth of 5.5 percent in the financial year that ends in March 2015.

Jaitley's predecessor set the 4.1 percent fiscal deficit target in an interim budget before the new government took office.

That may already be unrealistic, because the previous government left a stack of unpaid bills to state oil companies that have eaten into this year's finances.

A Reuters poll of economists this week predicted the government would set a new deficit target of 4.4 percent.

D.K. Joshi, the principal economist at the Indian arm of Standard & Poor's, CRISIL Ratings, said he would welcome a higher deficit goal, as the number set by the last government was always under a cloud of doubt.

"If 4.5 percent is credible and arrived in a correct manner, then it shouldn't be a problem. It should be a feasible target," he said. "But if the fiscal deficit target is aggressive, it would again be a question mark."

"In May, S&P affirmed a negative outlook for India's credit rating. Last year, it warned there was a one-third chance of a downgrade to "junk" without a big improvement in the fiscal deficit and in implementing reforms.

Wednesday's report recommended tackling food and fertiliser subsidies to lower spending while broadening the tax base. India's tax collection is less than 9 percent of GDP, a quarter of the average in the OECD group of developed nations.

"It is better to achieve fiscal consolidation partly through a higher tax-GDP ratio than merely through reduction in the expenditure-to-GDP ratio, in view of the large unmet development needs," the report said.

To balance the books, Jaitley is expected to set a high target in the budget for the sale of government-held assets in state-run and private companies.

Indian markets seemed reassured by the stern tone on fiscal consolidation. Stocks reversed earlier losses, while the 10-year bond yield eased to around 8.69 percent from 8.73 percent before the report.

Asia's third-largest economy has been stuck in its longest rut in a quarter of a century - with growth below 5 percent - while



Modi's government has been dogged by a food-price spike in its early weeks.

Modi, 63, won a landslide general election victory in May with a pledge to boost growth and create jobs for the 1 million people who enter India's workforce every month.

The budget for the current fiscal year was delayed by the election, which handed Modi's Bharatiya Janata Party (BJP) the strongest electoral mandate in India in three decades.

(Reporting by Manoj Kumar, Ratnajyoti Dutta, Nigam Prusty, Suvashree Dey Choudhury and Krishna Das; Writing by Frank Jack Daniel; Editing by Douglas Busvine and Richard Borsuk)

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Dilhan
Pr. Babu Chinn
marked ✓

∴ **9th Nutra India Summit**

Bangalore, 12 March 2014

**Nutraceutical Science and Achieving
the Zero Hunger Challenge**

Prof M S Swaminathan, FNA, FRS
UNESCO Chair in Ecotechnology, MSSRF, Chennai





Dr Indira
Baskaran
CTPR - Health
Adulterants
(for Roma)

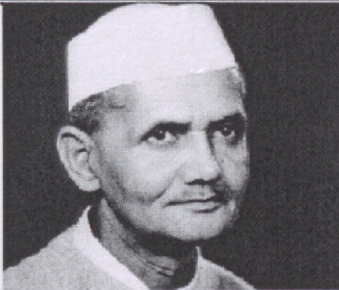
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Science

Political Support to ~~Scientists and Farmers~~

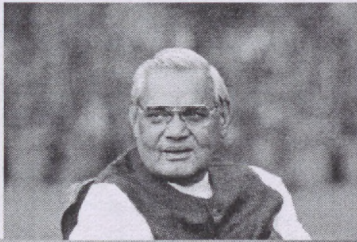




Jai Jawan
Jai Kisan



Jai Vigyan

The future belongs to science and to those who make friendship with science







✓


Community
Hunger
Rights


over a Tribal Women
Rising System An Mahila
- dependent (for Salaff)
+ technology

Navara Rice
Quality Waterway Project
[Codes abundant]




United Nations Secretary-General's Vision (2012)







ZERO
stunted children
less than
2 years




100%
access
to adequate
food
all year round



ALL
food
systems
are
sustainable




100%
increase
in smallholder
productivity
and income




ZERO
loss
or
waste
of food

HUNGER CAN BE ELIMINATED IN OUR LIFETIMES

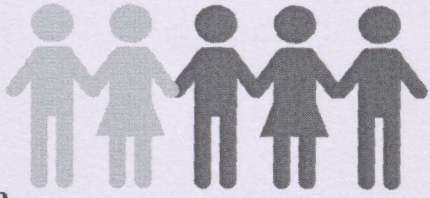


Source: www.un.org





South Asian Enigma

- Extraordinary economic growth in South Asia
- Population largely dependent on agriculture
- Yet, 2 out of 5 children stunted



**39% of children are stunted
in South Asia**

UNICEF 2013

South Asian Enigma

Fin Page 49

∴ Green Revolution Symphony (1968)



Major Components

- Technology
- Services
- Public Policies
- Farmers' enthusiasm



Indian farmers achieved as much progress in wheat production in four years (1964–68), as during the preceding 4000 years.

**Scientific skill, Political will and Farmers' toil -
major ingredients of the revolution**



∴ Genetic Containment of Wheat Rusts

Stem, Leaf and Stripe Rusts

1953 : Composite Varieties - phenotypically similar but genotypically diverse

1960 : Gene pyramiding

Genetic Shield - gene deployment strategy

March 2009 : Check-mating UG-99, a virulent stem rust race in wheat



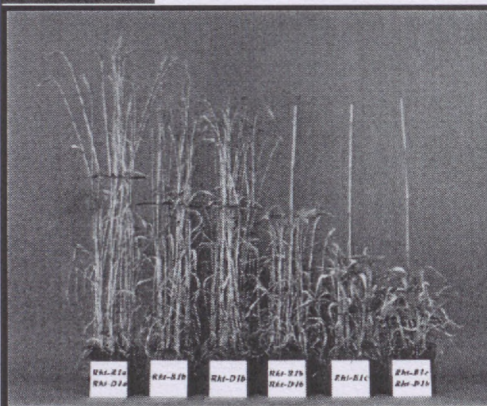
⋮
Ehrlich (1968)
⋮

- o Some time between 1970 and 1985 the world will undergo vast famines — hundreds of millions of people are going to starve to death. That is, they will starve to death unless plague, thermonuclear war, or some other agent kills them first.
- o The United States should announce that it will no longer ship food to countries such as India where dispassionate analysis indicates that the unbalance between food and population is hopeless.

Source : *The Population Bomb*



The Green Revolution And The Dwarf Phenotype



The effects of different *Rht* alleles on plant height in wheat (cv. April Bearded). The wild-type contains *Rht-B1a* and *Rht-D1a*, which are homoeologous (corresponding) genes on the B and D genomes. *Rht-B1c* is a more severe allele at the *Rht-B1* locus

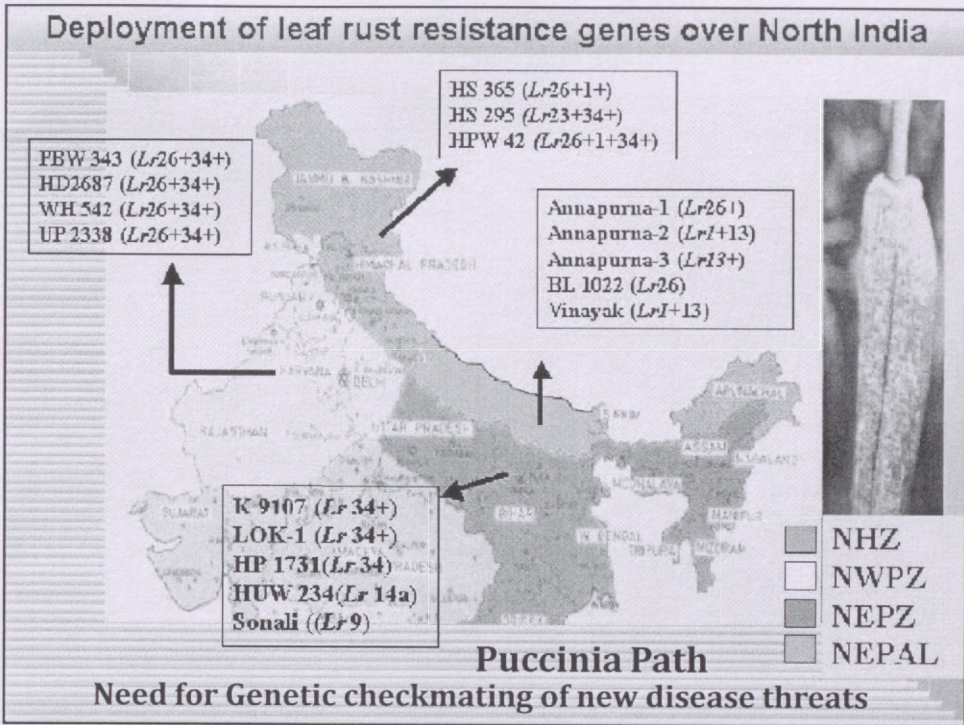


Comparison of woo-gen (right) and dee-geo-woo-gen strains, the latter containing the *sd1* mutation

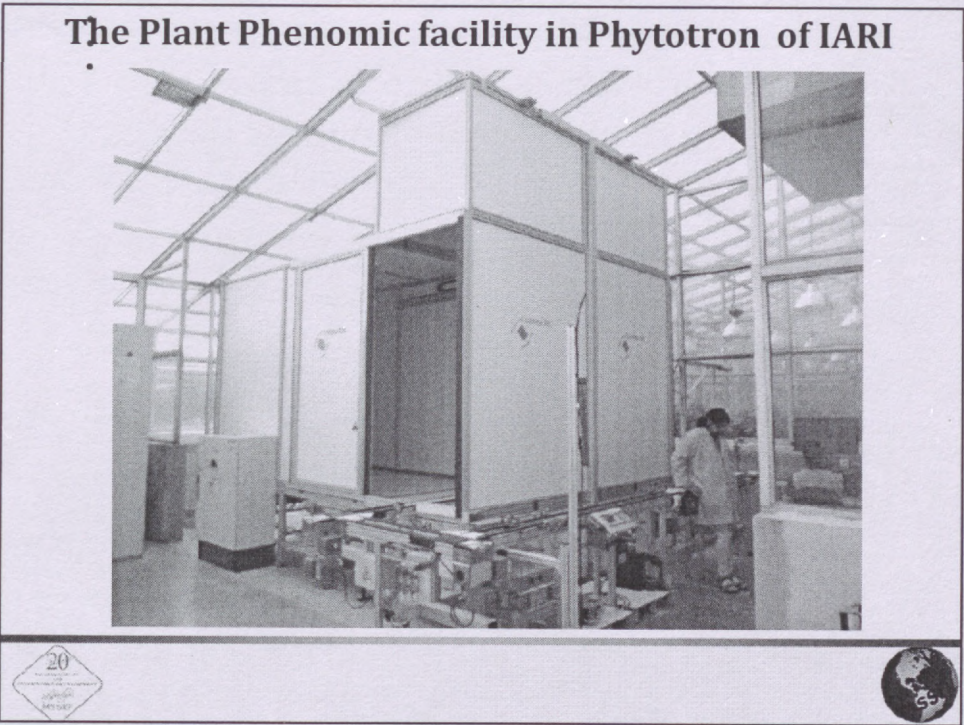


Source: <http://5e.plantphys.net/>





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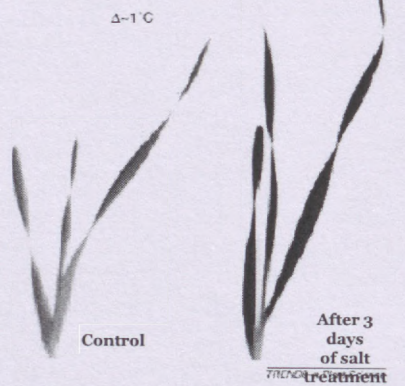
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Parameters measured for Plant Phenotyping in Wheat at IARI

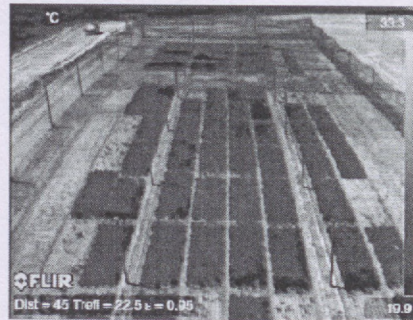
- Leaf area
- Chlorophyll content
- Stem diameter
- Plant height / width
- Growth rate
- Stress pigment concentration
- Tip burn
- Biomass
- Internode length
- Color
- Leaf rolling



Phenotyping of abiotic stress through thermal imaging



Thermal images of durum wheat seedlings treated with salt – temperature differential of 1°C



Thermal image of a wheat trial



2013 - A Significant Year in India's Struggle Against Hunger

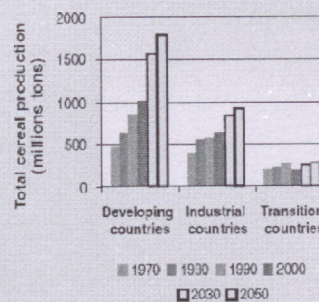
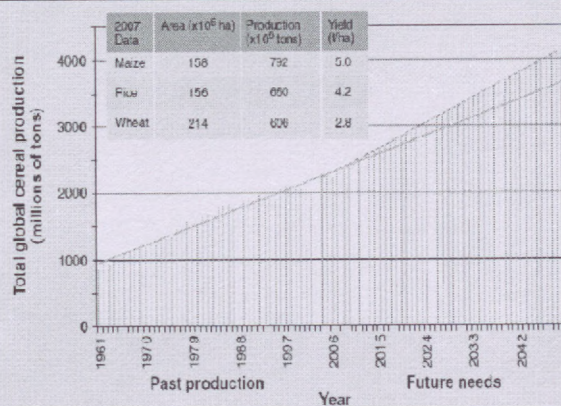
Some Milestones

- 1943 : Bengal Famine; 3 million children, women and men died of hunger
- 1963 : Beginning of intensive research on raising the ceiling to yield
- 1966 : Increasing PL 480 wheat imports, going upto 10 million tonnes
- 1968 : Issue of the stamp "Wheat Revolution", depicting the role of science in agricultural transformation
- 2013 : Parliament approves the National Food Security Act, conferring the legal right to food on over 70% of India's population

Thus, 2013 marks the transition from 'ship to mouth' to 'right to food' with home grown food



World Cereal Needs

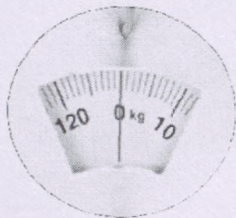


Tester and Langridge - Science 327, 818 [2010]





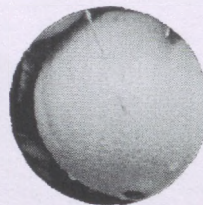
Three major dimensions of hunger



CALORIE DEPRIVATION



PROTEIN DEFICIENCY



MICRONUTRIENT DEFICIENCY



Picture Source: Google images



National Food Security Bill of India, 2013

1. Goal : To provide food and nutritional security in human life cycle approach, by ensuring access to adequate quantity of quality food at affordable prices
2. Enlargement of the Food Basket : Foodgrains mean rice, wheat or coarse grains (i.e. nutri-cereals)
3. Entitlement : Every person belonging to priority households shall be entitled to receive five kilogram of foodgrains per person per month at subsidised prices
4. Life Cycle approach with emphasis on the 1000 days of a child's life.
5. Women as custodians of household food security. The eldest woman, over 18 years of age as head of household for the purpose of issue of ration cards.



: **Chhattisgarh Food Security Bill, 2012**
Food Entitlements

General Households	15 kg foodgrain at Rs.9.50/kg for rice and Rs.7.50/kg for wheat
Priority Households	35 kg foodgrain at Rs.2 / kg; 2 kg pulses at Rs.10/kg (in non-scheduled areas); 2 kg chana at Rs.5/kg (in scheduled areas); 2 kg iodized salt (free)
Antyodaya Households	35 kg foodgrain at Rs.1 per kg; 2 kg pulses at Rs.10/kg(in non-scheduled areas); 2 kg chana at Rs.5/kg(in scheduled areas); 2 kg iodised salt (free)

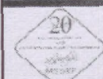
Addresses the problems of calorie deprivation, protein hunger and micronutrient malnutrition



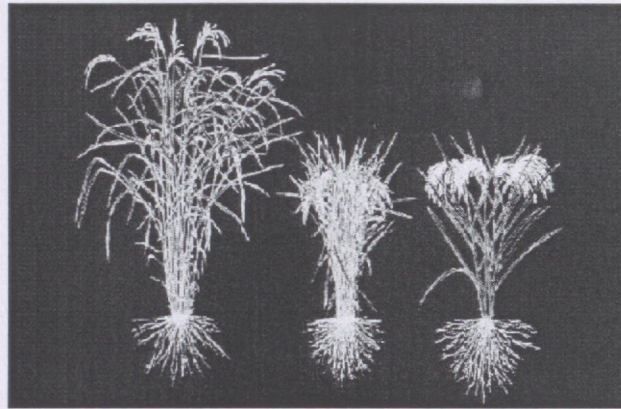
: **Multiple Micronutrient Enriched Salt**

- o Has been found to be stable during cooking and storage
- o Bio-available as seen in the improvement of micronutrients in the serum
- o Has improved cognitive and memory scores in children
- o Contains Vitamin A, Vitamin B12, Iron, Zinc and Iodine

Source : Dr Malavika Vinodkumar



Rice: The advent of new plant type in the 1960s



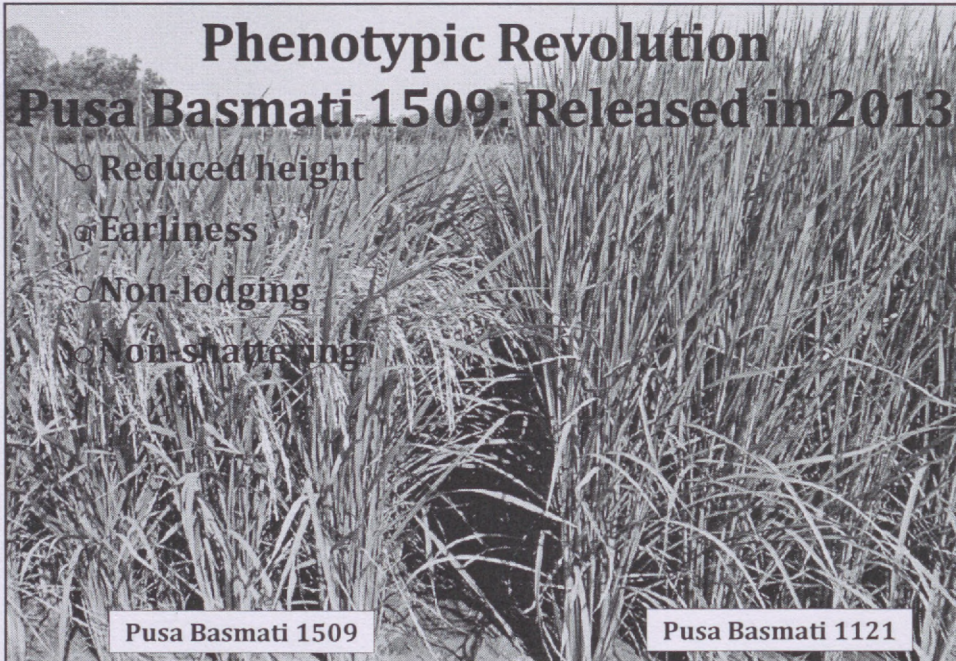
Non-lodging habit together with a vigorous root system



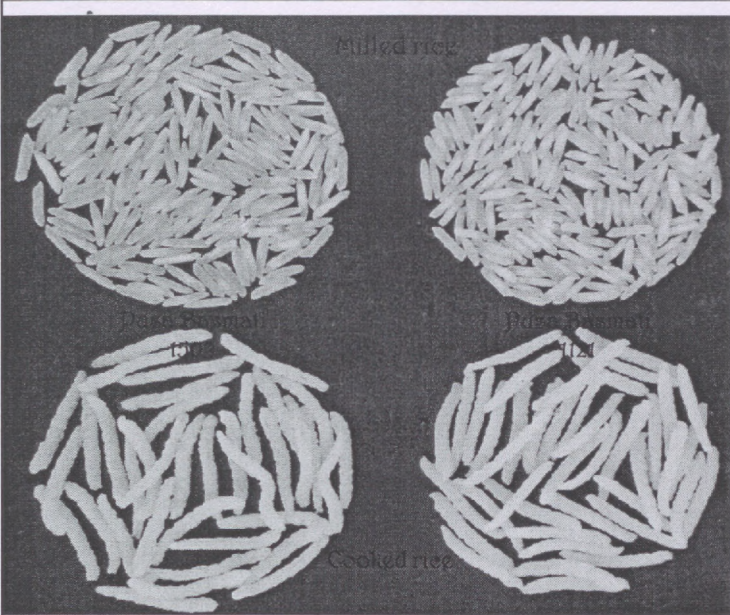
f

Phenotypic Revolution
Pusa Basmati 1509: Released in 2013

- Reduced height
- Earliness
- Non-lodging
- Non-shattering




X




There is need for information on functional genomics of cooked kernel elongation and volume expansion in Basmati rice

20



X

∴ Rachel Carson 1962 : Silent Spring




“Man has lost the capacity to foresee and to forestall. He will end by destroying the earth”

- Albert Schweitzer

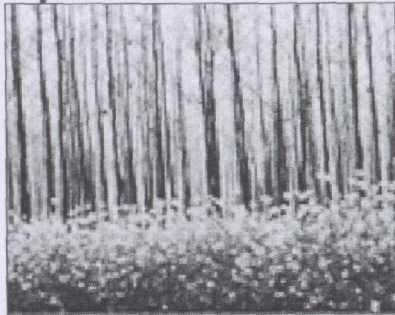
Sustainable Development : Early Warning

20



J

Evergreen Revolution is the Pathway



From Green to
Evergreen Revolution

Indian Agriculture:
Performance and Challenges

MS Swaminathan

- World requires 50% more rice in 2030 than in 2004 with approximately 30% less arable land of today
- Mainstreaming ecology in technology development and dissemination is the road to sustainable agriculture



From Green to an Ever-green Revolution Pathways

Green Revolution : Commodity-centred increase in productivity



Change In plant architecture, and harvest index
Change in the physiological rhythm-insensitive to photoperiodism
Lodging resistance

Evergreen Revolution : increasing productivity in perpetuity without associated ecological harm



Organic agriculture : cultivation without any use of chemical inputs like mineral fertilizers and chemical pesticides

Green Agriculture : conservation farming with the help of integrated pest management, integrated nutrient supply and integrated natural resource management

If farm ecology and economics go wrong, nothing else will go right



No Time to Relax : Major Challenges Ahead

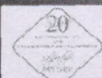
- Food losses and Food Waste
- Climate change : scientific checkmating of adverse impact
- Shrinking per capita land and water resources
- Expanding biotic and abiotic stresses
- Adverse cost-risk-return structure of farming
- Market volatility
- Reluctance of youth to take to farming

The Monsoon and the Market are two of the major determinants of farmers' well being



Climate Change : Temperature

- Global mean surface temperatures continue to rise. Eleven of the last 12 years rank among the 12 warmest years on record since 1850
- It is extremely likely that human influence has been the dominant cause of the observed warming since the mid 20th century. The evidence for this has grown
- Global surface temperature change for the end of the 21st century is projected to be likely to exceed 1.5°C relative to 1850 to 1900 in all but the lowest scenario considered, and likely to exceed 2°C for the two high scenarios
- Warming will continue to exhibit inter-annual-to-decadal variability and will not be regionally uniform



Source : SPM, IPCC AR-5



⋮

Sea Level Rise

- Global mean sea level has risen by 0.19 [0.17 to 0.21]m, estimated from a linear trend over the period 1901–2010
- Between 1993 and 2010, the rate was very likely higher at 3.2 [2.8 to 3.6] mm yr⁻¹
- Ocean thermal expansion and glacier mass loss are very likely the dominant contributors to global mean sea level rise during the 20th century
- Global mean sea level will continue to rise during the 21st century. Under all RCP scenarios the rate of sea level rise will very likely exceed that observed during 1971–2010 due to increased ocean warming and increased loss of mass from glaciers and ice sheets
- As the ocean warms, and glaciers and ice sheets reduce, global mean sea level will continue to rise, but at a faster rate than that have been experienced over the past 40 years



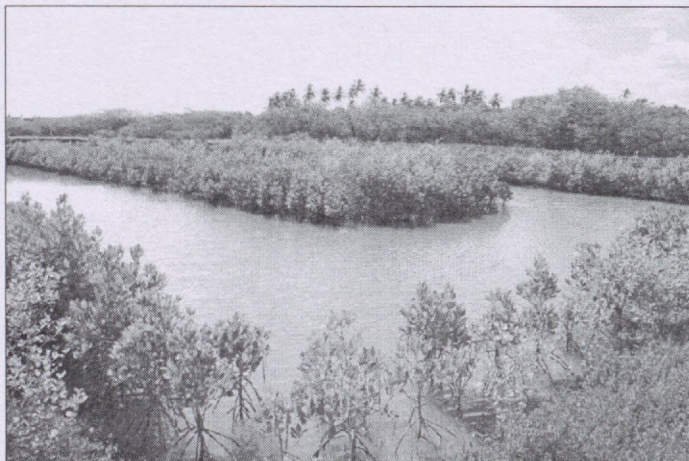
Source: SPM, IPCC AR-5



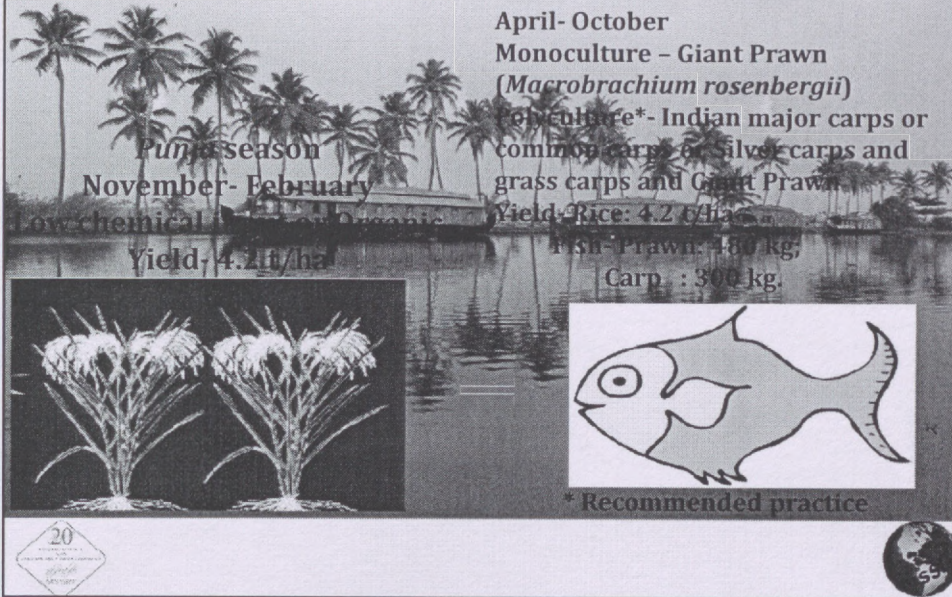
⋮

Sea Water Farming

(Sea water constitutes 97% of the world's water resource)



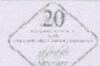

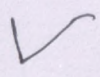
Innovations in below sea level farming in Kuttanad COCONUT - ONE RICE - ONE FISH





Punja season
November- February
Low chemical input, Organic
Yield: 4.2t/ha



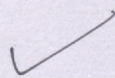
April- October
Monoculture - Giant Prawn
(*Macrobrachium rosenbergii*)
Polyculture* - Indian major carps or
common carps, Silver carps and
grass carps and Giant Prawn
Yield: Rice: 4.2 t/ha
Fish- Prawn: 400 kg,
Carp : 300 kg.

* Recommended practice

Genetic Garden of HALOPHYTES at Vedaranyam Converting Sea Water into Fresh Water through Halophytes

	
Obligatory halophytes	Facultative halophytes
Tolerate high concentration of sodium salts > 3 times of seawater salinity Even demand high NaCl for survival and reproduction 1560 species	Most of the species tolerate only moderate level of salinity Reproduction requires low saline condition Mangroves 60 species

Ingot

Sivalbandi shd

Eas-tu
Gene
Bank



Genes for Climate Resilience

Deepwater (floating) rice has three special adaptations:

- i. ability to elongate with the rise of water levels;
- ii. develop nodal tillers and roots from the upper nodes in the water
- iii. the upward bending of the terminal part of the plant called 'kneeing' that keeps the reproductive parts above the water as flood water subsides



f

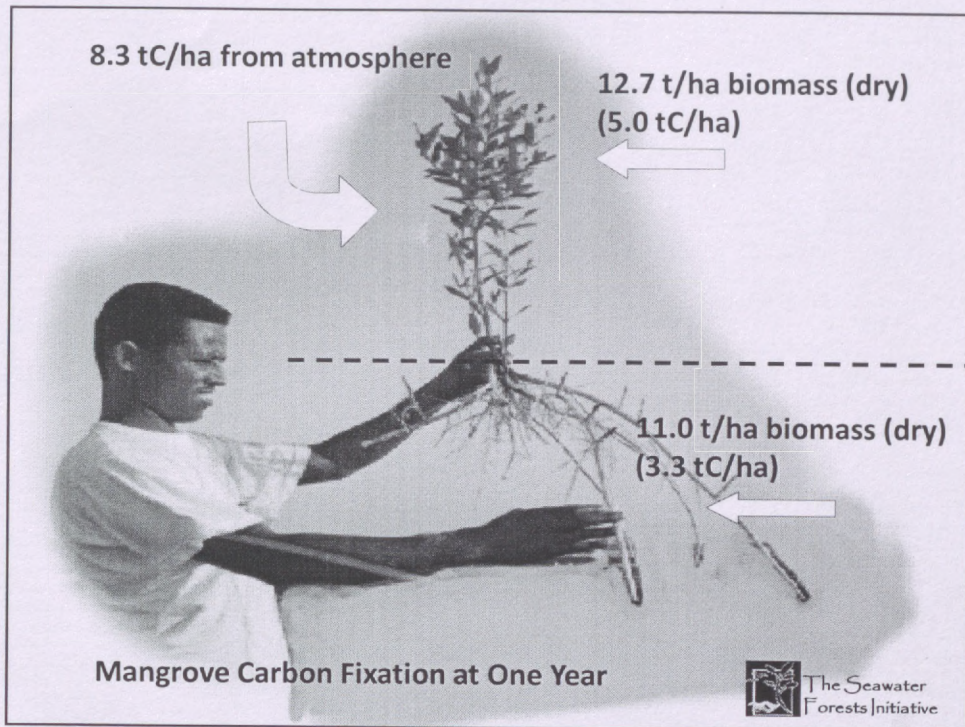
Genetic Shield against Sea Level Rise



Mangrove Forests



X



Salt tolerant Rice Plants with Mangrove Genes

10 days

C T CTRL Transgenic

1 month

Transgenic DCZ Control (UT)

Rice plants with Mangrove Genes and Promoter

Performance Evaluation

Characters	White ponni with 150mM NaCl	Transgenic with 150mM NaCl
Plant height (cm)	95.10	104.95
No. of productive tillers	9.90	14.20
Panicle length (cm)	17.08	22.45
No. of grains per panicle	134.60	174.80
100 grain weight (g)	1.45	1.63
Yield per plant (g)	20.30	34.75

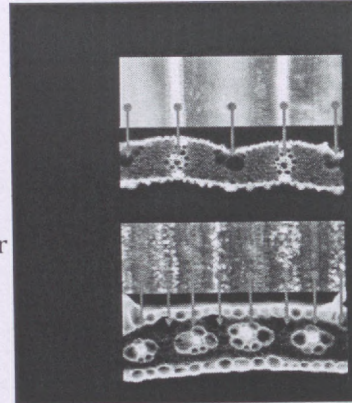
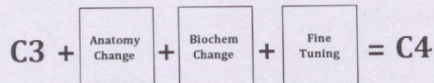
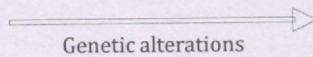
**: C4-re-engineering photosynthesis to
develop physiologically efficient rice**

C4 rice could:

- increase rice yield by 25-50%
- double water-use efficiency
- improve nitrogen-use efficiency

C4 photosynthesis is one of the few evolutionary mechanisms that could deliver these superior combination of benefits.

Evolutionary Change



f



P. Quick & J. Sheehy, IRRI



**: Some advantages of C4 photosynthetic
systems over C3 include**

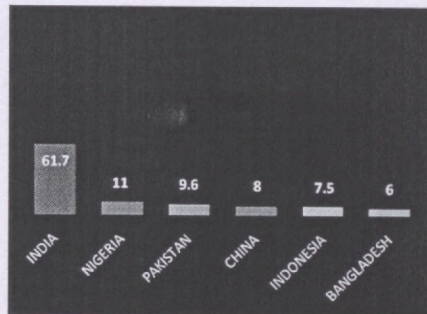
- Faster and more complete translocation of assimilates from leaves
- Photorespiration is rarely greater than 5% of the rate of photosynthesis while in C3 it can exceed 30% of the rate of photosynthesis above 30°C
- Almost twice the efficiency in dry matter production per unit of water transpired
- In drought prone ecosystems, yield could be maintained or increased with less water and less fertilizers
- Greater photosynthetic efficiency at high temperature

f



South Asian Enigma

- Region with the largest number of children with stunted growth
- First 1000 days critical. Low Birth Weight Babies 1 in 4
- Under-nutrition reduces a nation's economic advancement by 8% (Lancet 2013)



UNICEF 2013

Shift to
Page 2



Agro-forestry Remedy for Nutritional Malady *Moringa Oleifera*



25 x iron in spinach
17 x calcium in milk
15 x potassium in bananas
10 x vitamin A in carrots
9 x protein in yogurt



National Geographic, November 2012

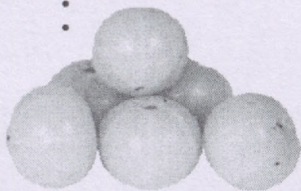


Breadfruit Can Be Manna



- The Breadfruit Institute has found that the perennial trees produce more food in dry weight per hectare than corn, rice, or wheat
- A fruit rich in iron, potassium, and Vitamin A precursors

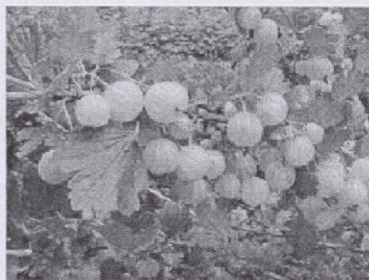
Source: Science Vol 342 18 October 2013



**Rich source
of Vitamin C**



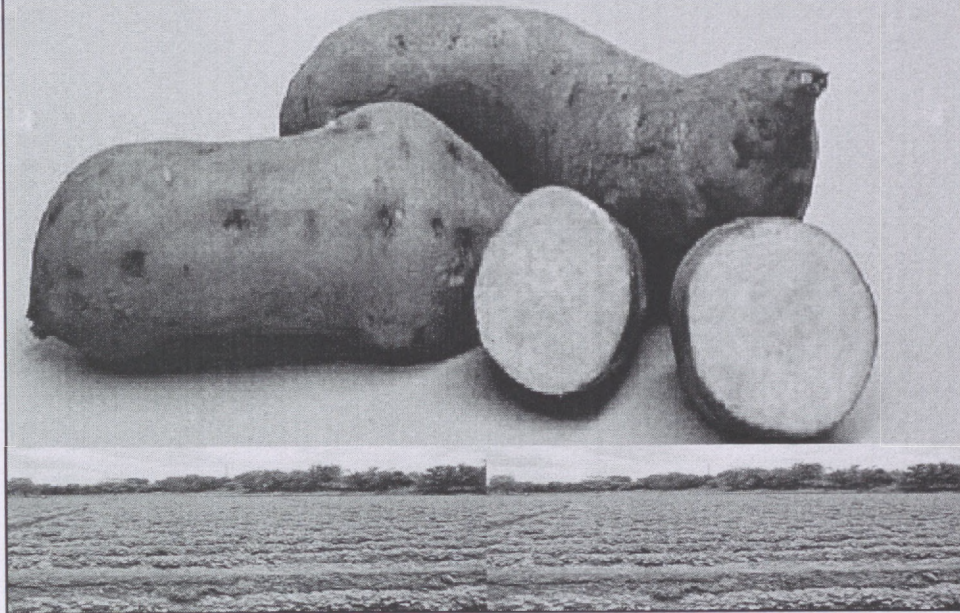
Amla Plant



Phyllanthus emblica



Orange-fleshed Sweet Potato Rich in Beta carotene



Sweet Potato

• Biofortification: High-iron Pearl Millet



**ICTP 8203
ICRISAT-bred OPV
(70-74 ppm Fe)
With 10% Higher Yield
Marketed by NIRMAL SEEDS**

**86M86
Pioneer hybrid (54-64 ppm Fe)**



∴ **Mango - Wheat (Horti-agri farm)**



Maximising benefit from cubic volumes of air and soil



∴ **Agro-forestry System involving
Fertilizer Trees**

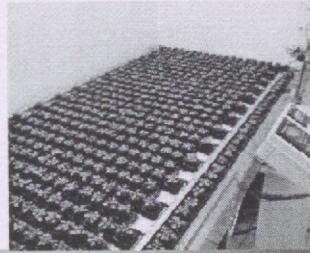
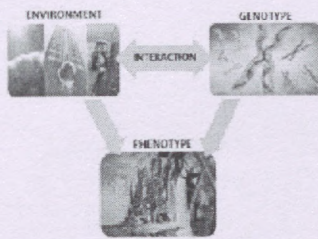


Building Soil Carbon Banks



: Linking Genome to the Phenome

In this area, we face challenges such as the establishment of robust protocols and screening methods, which integrate non-invasive, automated high throughput measurement of relevant plant traits both under controlled greenhouse and field scenarios. Plant phenotyping is fast developing as a scientific field that aims to quantify accurately phenotypic traits, and give valuable prognoses for plant environment interaction



Koraput - Tribal women
Cooperative

Bhakra Dam

From Wikipedia, the free encyclopedia

Coordinates: 31°24′39″N 76°26′0″E﻿ / ﻿



This article **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. *(March 2010)*

Bhakra Dam is a concrete gravity dam across the Sutlej River, and is in Bilaspur, Himachal Pradesh in northern India.

The dam, located at a gorge near the (now submerged) upstream Bhakra village in Bilaspur district of Himachal Pradesh, is India's second tallest at 225.55 m (740 ft) high next to the 261m Tehri Dam.^[1] The length of the dam (measured from the road above it) is 518.25 m; it is 9.1 m broad. Its reservoir, known as the "Gobind Sagar", stores up to 9.34 billion cubic metres of water, enough to drain the whole of Chandigarh, parts of Haryana, Punjab and Delhi. The 90 km long reservoir created by the Bhakra Dam is spread over an area of 168.35 km². In terms of storage of water, it withholds the second largest reservoir in India, the first being Indira Sagar Dam in Madhya Pradesh with capacity of 12.22 billion cu m.

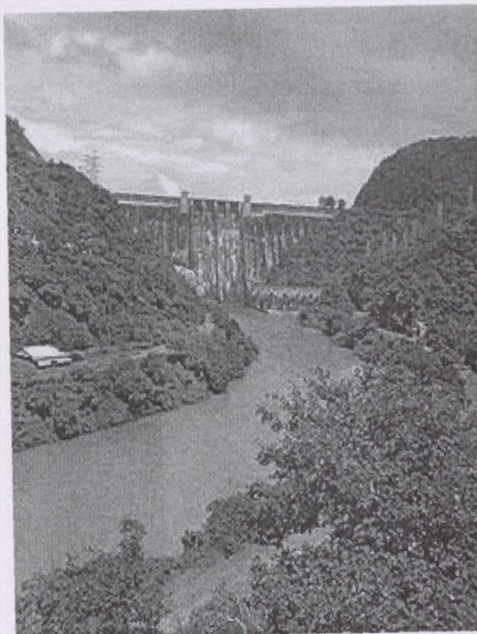
Described as "New Temple of Resurgent India" by Jawaharlal Nehru,^[2] the first prime minister of India, the dam attracts tourists from all over India.

Nangal dam is another dam downstream of Bhakra dam. Sometimes both the dams together are called Bhakra-Nangal dam though they are two separate dams.

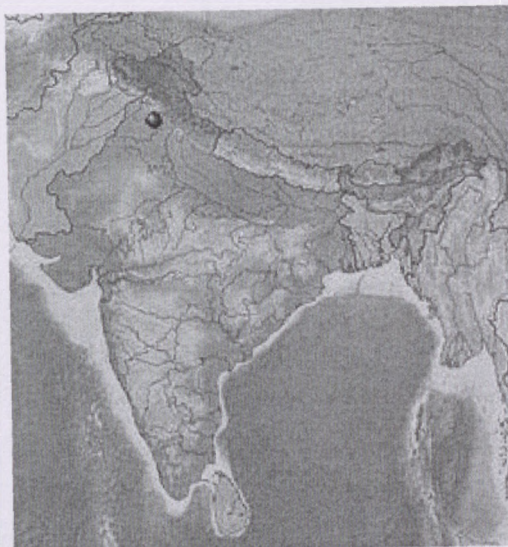
Contents [hide]

- 1 History
- 2 Features
 - 2.1 Irrigation
 - 2.2 Electricity generation
 - 2.3 Tourism
- 3 See also
- 4 Notes
- 5 External links

Bhakra Dam



The Bhakra Dam



Bhakra Dam in Bilaspur, Himachal Pradesh

Official name	Bhakra Dam
Location	Bilaspur, Himachal Pradesh
Coordinates	31°24′39″N 76°26′0″E﻿ / ﻿
Construction began	1948
Opening date	1963
Construction cost	245.28 crore INR in 1963

Dam and spillways

Type of dam	Concrete gravity
Impounds	Sutlej River

History [edit]

The Bhakra-Nangal multipurpose dams were among the earliest river valley development schemes undertaken by India after independence though the project had been conceived long before India became a free nation. Preliminary works commenced in 1946. Construction of the dam started in 1948, Jawahar Lal Nehru poured the first bucket of concrete into the foundations of Bhakra on 18 November 1955 ^[3] and the dam was completed by the end of 1963. Successive stages were completed by the early 1970s.

Initially, the construction of the dam was started by Sir Louis Dane, the Lieutenant Governor of Punjab. But the project got delayed and was restarted soon after Independence. In October 1963 at the ceremony to mark the dedication of the Bhakra–Nangal Project to the Nation, Prime Minister Jawaharlal Nehru said, "This dam has been built with the unrelenting toil of man for the benefit of mankind and therefore is worthy of worship. May you call it a Temple or a Gurdwara or a Mosque, it inspires our admiration and reverence". On 22 October, 2013, Bhakra Dam on the 50 year anniversary of the Nation and Bhakra Beas Management Board to mark the occasion, the Government of India has approved the release of a Commemorative stamp.

Features [edit]

The dam, at 741 ft (226 m), is one of the highest gravity dams in the world (compared to USA's largest Hoover Dam at 743 ft). The 166 km² Gobindsagar Reservoir, named after Guru Gobind Singh, is created by this dam which is the third largest reservoir in India the first being Indira Sagar Dam and second Nagarjunasagar Dam.^[4] The river Satluj used to flow through a narrow gorge between two hills, Naina Devi ki dhar and Ramgarh ki dhar, and the site was chosen to dam the river. The map nh-43-03.jpg shows the location of the original Bhakra village that was submerged in the lake formed behind the dam.

It is 15 km from Nangal City and 20 km from Naina Devi. The city Nangal is also called Bhakra Nangal Dam due to the presence of Nangal Dam. The Bhakra Dam and Nangal Dam are two separate dams: water flooded from Bhakra Dam is actually controlled and maintained by Nangal Dam.

The dam was part of the larger multipurpose Bhakra Nangal Project whose aims were to prevent floods in the Sutluj-Beas river valley, to provide irrigation to adjoining states and to provide hydro-electricity. It also became a tourist spot for the tourists during later years because of its huge size and uniqueness.

Irrigation [edit]

The dam was constructed with an aim to provide irrigation to Himachal Pradesh and Punjab. Another reason behind the construction of the dam was to prevent damage due to monsoon floods. The dam provides irrigation to 10 million acres (40,000 km²) of fields

Length	1,700 ft (520 m)
Height	741 ft (226 m)
Width (crest)	30 ft (9.1 m)
Width (base)	625 ft (191 m)
Spillway type	Controlled, overflow
Reservoir	
Creates	Gobindsagar Reservoir
Total capacity	9.340 km ³
Surface area	168.35 km ²
Power station	
Commission date	1960-1968
Turbines	5 x 108 MW, 5 x 157 MW Francis-type
Installed capacity	1325 MW

Bhakra Dam bridge

Total length	1700 feet
Width	30 feet

in Himachal Pradesh, Punjab, Haryana, and Rajasthan. It also has five flood gates to control floods.

Electricity generation [edit]

Bhakra and Nangal dams house hydroelectric power generators, which are situated on both the sides of the dams. Nangal hydel Channel and Anandpur Sahib Channel are used for power generation and irrigation purposes.

Each power plant consists of five turbines. Two power houses with a total capacity of 1325 MW flank the dam, on either side of the river. The left power house contains 5 x 108 MWFranis turbines while the right 5 x 157 MW.^[5]

Now, on 30th October 2013, Bhakra Nangal Dam is celebrating 50 years of its construction. The celebrations are high right now in Nangal Dam.

The power generated at Bhakra Power houses is distributed among partner states of Himachal Pradesh, Punjab, Haryana, Rajasthan, and Gujarat

Tourism [edit]

Being the Second highest dam in India, it attracts a large number of tourists who visit its reservoir and attractive location. The distance between the Ganguwal and Bhakra Dam is about 30–35 km.

Sardar Sarovar Dam

From Wikipedia, the free encyclopedia

Coordinates: 21°49′49″N 73°44′50″E﻿ / ﻿21.83028°N 73.74722°E﻿ / 21.83028; 73.74722

The **Sardar Sarovar Dam** is a gravity dam on the Narmada River near Navagam, Gujarat in India. It is the largest dam and part of the Narmada Valley Project, a large hydraulic engineering project involving the construction of a series of

*New Temples
of India*

Sardar Sarovar Dam



The Sardar Sarovar Dam, partially completed in August 2008



Location of Sardar Sarovar Dam

Country	India
Location	Navagam, Gujarat
Coordinates	21°49′49″N 73°44′50″E﻿ / ﻿21.83028°N 73.74722°E﻿ / 21.83028; 73.74722
Status	Operational
Owner(s)	Narmada Control Authority
Dam and spillways	
Type of dam	Gravity, concrete
Impounds	Narmada River
Length	1,210 m (3,970 ft)
Height (foundation)	163 m (535 ft)
Spillway capacity	84,949 m ³ /s (2,999,900 cu ft/s)
Reservoir	
Total capacity	9,500,000,000 m ³ (7,701,775 acre·ft)
Active capacity	5,800,000,000 m ³ (4,702,137 acre·ft)
Catchment area	88,000 km ² (34,000 sq mi)
Surface area	375.33 km ² (144.92 sq mi)
Max. length	214 km (133 mi)
Max. width	1.77 km (1.10 mi)
Normal elevation	138 m (453 ft)
Power station	
Operator(s)	Sardar Sarovar Narmada Nigam Limited
Commission date	June 2006

Turbines	Dam: 6 x 200 MW Francis pump-turbine Canal: 5 x 50 MW Kaplan-type ^[1]
Installed capacity	1,450 MW
	Website
	www.sardarsarvardam.org

large irrigation and hydroelectricmulti-purpose dams on the Narmada River. The project took form in 1979 as part of a development scheme to increase irrigation and produce hydroelectricity.

One of the 30 dams planned on river Narmada, Sardar Sarovar Dam (SSD) is the largest structure to be built. It has a proposed final height of 163 m (535 ft) from foundation.^[2] The project will irrigate more than 18,000 km² (6,900 sq mi), most of it indrought prone areas of Kutch andSaurashtra. The dam's main power plant houses six 200 MW Francis pump-turbines to generate electricity and afford a pumped-storage capability. Additionally, a power plant on the intake for the main canal contains five 50 MW Kaplan turbine-generators. The total installed capacity of the power facilities is 1,450 MW.

Contents [hide]

- 1 Narmada Canal
 - 1.1 Solar power generation
- 2 Projected benefits
- 3 Controversy
- 4 Height increases
 - 4.1 Report of the Ministry of Environment and Forests (MoEF)
 - 4.2 The Supreme Court decision
- 5 References
- 6 External links

Narmada Canal [edit]

Main article: Narmada Canal

The dam will irrigate 17,920 km²(6,920 sq mi) of land spread over 12 districts, 62 talukas, and 3,393 villages (75% of which is drought-prone areas) in Gujarat and 730 km² (280 sq mi) in the arid areas ofBarmer and Jalore districts of Rajasthan. The dam will also provide flood protection to riverine reaches measuring 30,000 ha (74,000 acres) covering 210 villages and Bharuch city and a population of 400,000 in Gujarat.^[3]

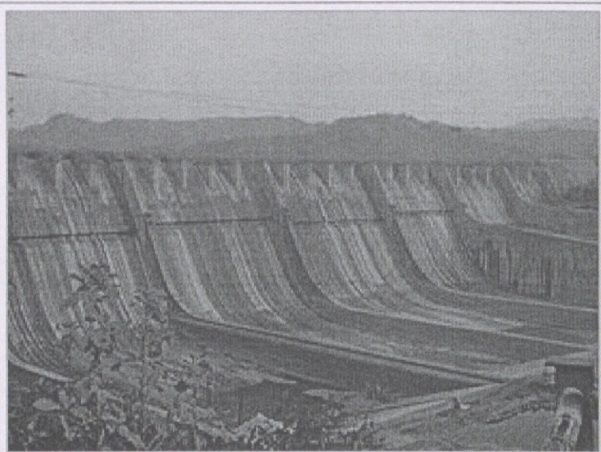
Solar power generation [edit]

The government of Gujarat plans to generate solar power by placing solar panels over the canal, making it beneficial for the surrounding villages to get power and also helping to reduce the evaporation of water. The first phase consists of covering 25 km to generate 25 MW of power.^[4]

Projected benefits [edit]

The benefits of the dam as listed in the Judgement of Supreme Court of India in 2000 were:

"The argument in favour of the Sardar Sarovar Project is that the benefits are so large that they substantially outweigh the costs of the immediate human and environmental disruption. Without the dam, the long term costs for people would be much greater and lack of an income source for future generations would put increasing pressure on the



The Sardar Sarovar Dam, undergoing height increase in 2006.

- to 95 m (312 ft).
- In March 2004, the Authority allowed a 15 m (49 ft) height increase to 110 m (360 ft).
- In March 2006, the Narmada Control Authority gave clearance for the height of the dam to increased from 110.64 m (363.0 ft) to 121.92 m (400.0 ft). This came after 2003 when the Supreme Court of India refused allow the height of the dam to increase again.
- In August 2013, heavy rains raised the reservoir level to 131.5 m (431 ft),

which forced 7,000 villagers upstream along the Narmada River to relocate.^[13]

Report of the Ministry of Environment and Forests (MoEF) [edit]

The Second Interim Report of the Experts' Committee set up by the Ministry of Environment and Forests (MoEF) of the Government of India to assess the planning and implementation of environmental safeguards with respect to the Sardar Sarovar (SSP) and Indira Sagar projects (ISP) on the Narmada River. The report covers the status of compliances on catchment area treatment (CAT), flora and fauna and carrying capacity upstream, command area development (CAD), compensatory afforestation and human health aspects in project impact areas. Construction, on the other hand, has been proceeding apace: the ISP is complete and the SSP nearing completion. The report recommends that no further reservoir-filling be done at either SSP or ISP; that no further work be done on canal construction; and that even irrigation from the existing network be stopped forthwith until failures of compliance on the various environmental parameters have been fully remedied.^[14]

The Supreme Court decision [edit]

Despite popular protest, the Supreme Court gave clearance for the height to be increased to 121.92 m (400 ft), but in the same judgment Justice Mr. Bharucha gave directions to Madhya Pradesh and Maharashtra (the Grievance Redressal Authorities of Gujarat) that before further construction begins, they should certify (after inspection) that all those displaced by the raise in height of 5 metres have already been satisfactorily rehabilitated, and also that suitable vacant land for rehabilitating them is already in the possession of the respective States. This process shall be repeated for every successive five metre increase in height.

environment. If the waters of the Narmada river continuous to flow to the sea unused there appears to be no alternative to escalating human deprivation, particularly in the dry areas of Gujarat.

The project has the potential to feed as many as 20 million people, provide domestic and industrial water for about 30 million, employ about 1 million, and provide valuable peak electric power in an area with high unmet power demand (farm pumps often get only a few hours power per day). In addition, recent research shows substantial economic multiplier effects (investment and employment triggered by development) from irrigation development. Set against the futures of about 70,000 project affected people, even without the multiplier effect, the ratio of beneficiaries to affected persons is well over 100:1."^[5]

Controversy [edit]

Main article: Narmada Bachao Andolan

The dam is one of India's most controversial dam projects and its environmental impact and net costs and benefits are widely debated. The World Bank was initially a funder of the SSD, but withdrew in 1994. The Narmada Dam has been the centre of controversy and protest since the late 1980s.^[6]

One such protest takes center stage in the Spanner films documentary *Drowned Out*(2002), which follows one tribal family who decide to stay at home and drown rather than make way for the Narmada Dam.^[7] An earlier documentary film is called *A Narmada Diary* (1995) by Anand Patwardhan and Simantini Dhuru. The efforts of NBA to seek social and environmental justice for those most directly affected by the Sardar Sarover Dam construction feature prominently in this award winning film (Filmfare Award for Best Documentary-1996).^[8]

The figurehead of much of the protest is Medha Patkar, the leader of the "Narmada Bachao Andolan," the "Save Narmada Movement."^[9] The movement was cemented in 1989, and was awarded the Right Livelihood Award in 1991.^[10]

Support for the protests also came from Indian author Arundhati Roy, who wrote "The Greater Common Good", an essay reprinted in her book *The Cost of Living*, in protest of the Narmada Dam Project.^[11] In the essay, Roy states:

Big Dams are to a Nation's 'Development' what Nuclear Bombs are to its Military Arsenal. They are both weapons of mass destruction. They're both weapons Governments use to control their own people. Both Twentieth Century emblems that mark a point in time when human intelligence has outstripped its own instinct for survival. They're both malignant indications of civilisation turning upon itself. They represent the severing of the link, not just the link—the understanding—between human beings and the planet they live on. They scramble the intelligence that connects eggs to hens, milk to cows, food to forests, water to rivers, air to life and the earth to human existence.

Height increases [edit]

- In February 1999, the Supreme Court of India gave the go ahead for the dam's height to be raised to 88 m (289 ft) from the initial 80 m (260 ft).
- In October 2000 again, in a 2-to-1 majority judgment in the Supreme Court, the government was allowed to construct the dam up to 90 m (300 ft).^[12]
- In May 2002, the Narmada Control Authority approved increasing the height of the dam

Table A to the Annex

Sum of
Studies

1. Perkembangan Faktor -

ISFPCO & KRIPCO

(Di Kumpul Lecture)

2. Babua - Mangal Injaga

Angat

Grand Anaricut

Fin Web

3. Intensive Agricultural

District Programme (IADP)

- Fin Web

4. High Yielding Varieties Programme

(1966)

5. Other Special Applications

Add the 'Women Farmers'
Entrepreneurial Skill

Take it to the Farmer

1. Lab to Lab : All India Coordinated
Research Project

2. Lab to Land : • Natural Demonstration
• Krishi Vigyan
Kendras

• Village Knowledge
and Resource centres
• Mobile Soil Testing Van

• Land to Lab : • Farmer Participatory
Research

• Seed Villages (Jumbh)

• Land to Land : • Farm Schools

Gender - Focus

From the Women's
Empowerment Bill

Slides : Dr Naganaras

Wheat - National
Demerkato

Puduberry (Vidya Kambur)

Rust KVK

Dr Karthika

National Demerkato

KVKs

Nancy

Farm School

VKc. - Butem

VKc. -

White Soil Testing
Farm

NATIONAL NUTRACEUTICAL CENTER

What Are Nutraceuticals?

Definition of a Nutraceutical:

"Food, or parts of food, that provide medical or health benefits, including the prevention and treatment of disease."

Dr. Stephen DeFelice, Foundation for Innovation in

Medicine

Nutraceutical Categories:

Dietary Supplements including botanicals:

- Vitamins, minerals, co-enzyme Q, carnitine
- Gingseng, Gingko Biloba, Saint John's Wort, Saw Palmetto

Functional Foods:

- Oats, bran, psyllium and lignin's for heart disease and colon cancer
- Prebiotics - oligofructose for control of intestinal flora
- Omega-3 milk in prevention of heart disease
- Canola oil with lowered triglycerides for cholesterol reduction
- Stanols (Benecol) in reduction of cholesterol adsorption

Medicinal Foods:

- Transgenic cows and lactoferrin for immune enhancement
- Transgenic plants for oral vaccination against infectious diseases
- Health bars with added medications

What Caused the Rapid Emergence of Nutraceuticals?

Consumers dissatisfied with drug costs and conventional healthcare are turning to unproven and untested natural products for treatment and prevention.

- Chronic diseases with poor therapeutic alternatives
- Hurried impersonal exchanges with providers stressed by managed care
- Desire for personalized medicines
- Large population trying to stave off the effects of aging
- New focus on preventive medicine
- Public perception that "natural is good"

More than 40% of Americans use alternative medical therapies, nutraceuticals (herbals/botanicals) account for a significant

Intro to NNC

NNC Structure

Industry Advisory Board

Strategic Partners

What are Nutraceuticals

Activities/Services/Initiatives

Membership Information

Presentations

nutraceuticals (herbals/botanicals) account for a significant proportion.

Nutraceuticals, The Alternative Crop For Wellness And Prevention

Request

Fund an initiative at the National Nutraceutical Center that brings together industry, academia, and government to jointly apply cost-effective scientific approaches in agricultural and manufactural efforts to make nutraceuticals a highly profitable crop. The Center will disseminate the results to the general public and to healthcare, agriculture, and manufacturing industries and will focus on:

- Basic and clinical research to determine key plant components, effectiveness, dosage levels, and interactions with other nutraceuticals and pharmaceuticals.
- Basic agricultural and plant biotechnology studies to determine how to grow nutraceuticals, maximize key ingredients, and develop a cash crop potential.
- Quality assurance and standards development at all levels of supply/manufacturing.

Today's Problem:

- U.S. healthcare costs are the highest in the world, while morbidity and mortality measures are not correspondingly the highest.
- Consumers dissatisfied with drug costs and conventional healthcare are turning to unproven and untested natural products, nutraceuticals, for treatment and prevention.
- Supply of "certified" products is limited and demand exceeds supply.
- Most raw materials are imported and lack government/industry control on product quality and contamination.

The nutraceutical industry in the US is about \$86 billion. This figure is slightly higher in Europe and, in Japan, represents approximately a quarter of their \$6 billion total annual food sales - 47% of the Japanese population consume nutraceuticals.

What Are the Benefits of Nutraceuticals in Medicine?

- Higher Confidence in Product Quality and Effectiveness
 - Improved Market for Nutraceutical Products
 - Increased Public Awareness
 - Increased Healthcare Industry Awareness
 - Establishment of a Self-Governing Agenda
-

Nutraceuticals as an Alternative Crop

Nutraceuticals. foods or food components that help in prevention or

treatment of disease, are made from herbal/botanical raw materials. This is a rapidly growing industry (7-12% per year) with more than 100 million people in the U.S. using these natural products. With extensive anecdotal data on exciting health results, nutraceuticals promise significant contributions to disease prevention. Nutraceutical crops can replace or complement traditional crops and, with vertical integration into American agriculture and manufacturing, will impact rural economic development. There are, however, barriers to the introduction of nutraceutical crops:

- Common belief that only imported herbals/botanicals are effective.
- Little data on the cultivation and adaptability of popular herbals/botanicals.
- Little data on how to make nutraceuticals a cash crop equal to more traditional crops.
- Wide range of manufacturing processes with no attention to product extraction, effective "shelf-life", storage, ingredient standards or contamination.
- Pending federal regulations which could further restrict the supply of natural products.

The South Carolina Research Authority (**SCRA**) is working with FDA and USDA, will provide neutral leadership for the Center. A broad base of biomedical and agricultural expertise will come from selected centers of excellence including the **Medical University of South Carolina** and **Clemson University**.



[Nutraceuticals in the News](#)



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