

## Youth, environmental improvement and happiness \*

**Anil K. Rajvanshi**  
**Nimbkar Agricultural Research Institute (NARI)**  
Phaltan, Maharashtra, India  
E-mail: [anilrajvanshi@gmail.com](mailto:anilrajvanshi@gmail.com)

The future of the world is the youth and they have to carry the torch of making this world a better place. It is however the duty of older generation to show them the proper path and direction. Most of the younger generation are smart, full of energy and want to do something useful with their lives. When no role models are available then their considerable energies go into destructive pursuits. Thus in the interest of future of our world it is imperative that all of us guide the youth for better world.

I feel that when youth work for common and noble good then it brings tremendous happiness and satisfaction and this is the theme that we will discuss in this essay.

### **Why environmental improvement?**

All life forms want a comfortable and happy life. In case of human beings it is a sum of two things, personal happiness and better environment.

Personal happiness can be obtained from a variety of ways. Basically one becomes happy when one is contented or at peace with oneself. We will talk about this later in the essay.

Environmental happiness is what I call community or nation building. It is the enabling environment which makes you feel happy to live in, work in and just be a part of it. This environmental happiness also gives us a sense of belonging, makes us feel proud of our surroundings and gives us a sense of ownership. If we create a happy environment for our work and living then we will make any country a great place to live. Each one of us should therefore work towards improving our immediate environment so that it becomes nice and cheerful. Then we will be genuinely proud to be a part of it. For environmental happiness and nation building we need excellent young people.

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\* This is an amalgamation of various talks I have given to students at various IITs and other premier technological Institutes in India and abroad.

## How youth can help in environment improvement?

First accept that whatever we are today is because of the country and society. Hence we should give something back to the society. Gratitude is the essence of being human. I believe that the whole purpose of our existence is to increase personal and societal infrastructure. Personal infrastructure includes health, happiness and general well being. By improving our personal “infrastructure” we become better human beings and it helps in our emotional growth and evolution. By giving back to the society so that its “infrastructure” increases we help in mankind’s evolution. Both these activities when carried out simultaneously can give us a great joy and satisfaction.

Most of us work towards fulfilling our basic needs. But once our basic needs are satisfied, all of us long for some meaningful existence. Even very rich are looking for some meaningful actions and purpose in their life. Happiness cannot be obtained by money alone. It only comes when there is some meaning to life. That meaning, I feel comes from helping other less fortunate people and by giving something back to the society.

We can all do this by keeping a certain portion of our time for it. Thus one should keep aside half an hour per day (only 2% of the time) for society work. It is almost 200 hours/year. This is substantial time for society and the work can add up year after year.

For environment improvement you can work on anything in which you interact with the surroundings and can help make it better. Thus work for helping needy students, cleaning the surroundings, energy saving etc. can all be part of your work for society.

Just trying to conserve energy in whatever way you can will be a great way of helping the society. Keep a daily log of the energy consumed and how you can save it. Even thinking on improving your surroundings, writing about it and telling others is society work. Similarly anything that you do within your means to help somebody else is also society work. Follow the mantra “act locally think nationally” and you will help in societal improvement.

However in all these things be very active and this activity will give you a positive frame of mind. Develop a “can do” approach. Everything is possible with a strong will and a good attitude. At young age the mind is very active and hence you should be bubbling with ideas. Best ideas are the maximum ideas. The more ideas you have the higher is the chance of producing a great idea.

Be positive in your approach. Rise above the negative things and make them irrelevant. This is how nature works. It evolves by branching out and only that branch, which interacts properly with the environment, survives and evolves. The other branch, which does not, withers away. Thus nature never suppresses the other branch – it becomes automatically irrelevant. Hence never try to bring others down. Rise up over

them and you will benefit by this strategy. This is a higher mode of development where the whole system is upgraded and lifted up. Learn to follow nature in everything you do specially in design. It has evolved through million of years and hence has great design templates to copy and emulate. Thus the mantra of design should be biomimicry.

Don't worry about the outcome. Positive things will happen if you are honest and conscientious in your work. You are doing the society work for your benefit namely discipline and discovery. Besides you will also feel tremendous satisfaction in helping others. Every work you do will help you learn new things and will help in increasing your "infrastructure". If you have this attitude then any work you do becomes enjoyable. Never say "what is in it for me". That is a negative attitude.

### **What are the issues in environmental improvement?**

Around 60% of our rural population [lives in very primitive conditions](#).<sup>1</sup> They have no electricity and their lives are in darkness. This is a sorry state of affairs even 62 years after independence. They use inefficient kerosene lanterns for light, primitive and ancient biomass cook stoves for cooking, and have no clean drinking water. Modern technology somehow has not touched their lives. Besides the poor quality of end product, the devices used by them create tremendous health problems. Thus there are estimates that around [300,000 deaths per year](#) in rural areas of India are attributable to inhaling smoke from the inefficient and primitive biomass stoves.<sup>2</sup> Similarly lack of clean drinking water kills about [1 million children every year in rural areas](#).<sup>3</sup>

Without these people getting into the mainstream, environment cannot be improved and India cannot become an economic super power. Around 54% of India's population is below the age of 25 years and most of them live in rural areas and are unemployed. This huge mass of energetic youth with increased aspirations is the engine of development. Creation of rural-based enterprises is the best way to create wealth, improve their quality of life and bring these people into mainstream of development. Our leaders are talking about making India the third biggest economy by 2012. Unless the lives of rural population are improved this will not be possible.

I am sure you will all go and become leaders and important people in your own enterprises, in corporate, Government and other sectors. In whichever sector you go use your considerable clout to help the rural population increase their quality of life. Even if you go abroad think how you can create conditions to improve the lives of these people. This is your contribution to the society.

In order for you to understand what rural population needs and how they can be helped it is necessary that you spend some time in becoming familiar with their plight. The best way to do so is to spend a year or so with rural-based NGOs. On a selfish note I would love to have 4-5 of you spend 1-2 year with my NGO. By spending time with rural

NGOs you will achieve two things. Firstly you will understand the problems of rural India and secondly you will know how these NGOs work. Later on this knowledge may help you in starting your own NGO if you wish to do so.

You all are in the age group of 20-25 years. Spending one or two years in rural areas will hardly be noticed by you later on but the experience will be extremely rewarding and it will attach you firmly to the roots of the society. This time spent in rural areas is also your contribution to the society because I am sure that young and bright students like you will think very hard on the problems that you will encounter during your stay. And I do hope that these experiences will stay with you the rest of your life so that when you have the resources and a chance you will do something about them.

Thus for some of you who will go in corporate area think how you can help in creating rural enterprises by creating venture funds. It is my firm belief that only a very strong partnership of corporate, NGOs and local community leaders can create a vibrant and wealthy rural India. Hence your internship experience in rural India should help you later on in forging and strengthening this partnership further.

For some of you who will go into R&D think about how you can develop technologies to create better devices for rural areas and for some of you who might go in Government service a whole range of activities will be open to you for helping the rural population.

### **Technology intervention**

In order to help the rural population improve their lives technological intervention is required. This is a technological age and we live in an industrial society. Whatever we do is governed by technology and thus technology plays an extremely important role in our lives. For rural areas sophisticated technology is needed. Most of the technology efforts in the past for providing basic facilities to rural areas have been based on a "tinkering" approach, meaning a small adjustment here and there, and using "low" or appropriate technology. This approach, which has been used by various agencies, normally resulted in incremental changes like development of improved chulhas (cook stoves) or better bullock carts. Tinkering, however, has barely made a dent in the quality of life of poor people.

Rural population has the same aspirations as you and I have. With increased exposure to mass media their desire to improve their lot has also increased. Thus technology intervention is required in using rural resources to provide products and services to these people. Filtering down approach of urban goods to rural areas will not work in the long run because of lack of infrastructure, resources and different rural situations.

Since the rural population want to improve their lot, the easiest way for them to do so is to migrate to urban centers. As we all see around us this is creating great social, economic and political problems in urban areas. There are estimates that by [2050 more than 50% of India's population will be urban.](#)<sup>4</sup> Besides taxing the already poor infrastructure in cities, this migration will have far reaching consequences for food production since less people will be involved in farming.

Thus there is a need to create new type of industries which will be based on locally available renewable sources like agricultural residues, solar, wind, etc. and which will produce wealth in rural areas. This is possible by the use of sophisticated – or “high” – technology which can efficiently convert these resources and materials into useful products. This is the hallmark of evolution where natural systems evolve into very efficient materials and energy converters. In this process, size reduce, increases efficiency and complexity of system takes place. Some of our designs and technologies are going the size reduction route. For example, computer chips, cell phones, power plants, etc. are all becoming very efficient, small in size and complex. Technology developers should follow this strategy in developing rural technologies. In fact, much more sophisticated thought and [“high” technology is required for solving rural problems](#) since the materials and energy resources available are limited and often only available in “dilute forms”.<sup>2</sup> Thus the strategy of high technology allows maximum energy and materials to be extracted for useful end products.

I also think that as students of a premier technological institute you should work in technology area rather than management. It is the technology and its appropriate applications, which provide solutions to mankind’s problems. Only after the technology becomes available that you can manage it. For rural areas the technology will not come from U.S. or Europe. We will have to develop it ourselves and some of our brightest minds should do it.

I will now give few examples where high technology intervention can provide a quantum jump in the quality of life of rural population. These examples are for lighting, cooking, energy production and provision of clean drinking water. Though these examples have been chosen but the same methodology can be used for any other area.

### **Strategy for lighting**

The history of civilization is the history of lighting. Lighting allowed mankind to extend daylight hours and hence increase productivity and commerce. It is a sad state of affairs in our country that nearly 62 years after independence 60% of rural population are without electricity. They use simple but very inefficient hurricane kerosene lantern for lighting. Presently we know of only two methods of lighting-liquid fuel and electricity-based.

Our institute NARI has developed an extremely efficient liquid fuel-based, dual purpose, lantern [called lanstove](#) which simultaneously provides light and cooks a complete meal for a family.<sup>5</sup> This lanstove produces about 1350 lumens (lm) of light (equivalent to light from a 100 W electric bulb) and 1 kW of thermal energy for cooking in a specially designed cook stove. The lanstove runs on low grade ethanol [55-60% (w/w) ethanol/water mixture] which is easy to produce from any locally available sugar-based raw material such as sugarcane, sweet sorghum, flowers, spoiled fruits etc. This ethanol uses much less energy to produce than the regular high grade ethanol, and is a very safe mixture for household purposes since water helps as a flame quencher. Also it is a very clean fuel so no soot and noxious gaseous fumes are emitted.

Since lanstove provides light and cooking energy simultaneously (no other lighting device does that), it is about 2.5 times more efficient than electric cooking and lighting! NARI has also produced an efficient ethanol-based cook stove for bigger cooking needs for a large family.

The lanstove produces light from thermoluminescent (T/L) mantles. In developing lanstove we became acutely aware of problems with T/L mantles. These mantles mostly contain mixtures of rare earth materials like thorium and cerium oxides and their lighting efficacy is [1-2 lumens \(lm\)/W](#).<sup>1</sup> On the other hand the lighting efficacy of 100 W light bulb is 10-15 lm/W and that of fluorescent lamp about 60 lm/W. These mantles have not changed since 1860s (they were developed in Germany at that time) and improving their efficacy will further increase the efficiency of lanstove.

Many people have tried to improve them but have not succeeded. We still do not understand how the light is produced from this mixture. The 2000°C flame produces light as if it is coming from a 3600°C black body. I feel the emerging field of nano-science can help in developing materials which can glow efficiently at 1000-1500°C. Besides R&D is necessary in making these mantles out of sturdier materials like carbon composites, ceramic-based thermoluminescent materials etc.

Ultimately for decentralized light based on chemical fuels we should learn from nature and try to copy the bioluminescence mechanism of firefly where visible light is produced very efficiently and at room temperatures. With grid electricity still a distant dream for a majority of rural areas, efficient chemical or liquid fuel lighting needs to be encouraged.

Simultaneously, we have to explore decentralized electricity-based lighting since 100 years of R&D has gone in perfecting this type of lighting. Thus decentralized electricity generating plants in rural areas are the future. The plants could be of various sizes ranging from 10-20 MW (for a taluka) to 10-20 W (for individual usage).

We at NARI pioneered the development of strategy of 10-20 MW capacity biomass- based power [plants for taluka level](#).<sup>6</sup> These plants would run on agricultural

residues. India produces about 600 million tons of these residues every year. Presently they are burned in the fields to achieve waste disposal. Theoretically they can produce about 80,000 MW of electric power or nearly 50% of total installed capacity of India. Thus the impact of such power plants can be huge since they can produce electricity and wealth in rural areas and to my mind should be the cornerstone of rural development strategy.

NARI's taluka energy program became a national policy and was run by Ministry of Non-conventional Energy Sources (now MNRE) from 1996 till 2002. About 40 biomass-based plants of 6 MW capacity each were set up and the whole program had a mixed successes. This was because the Electricity Act of 2003 had not been instituted and hence these plants had to sell electricity to loss-making state electricity boards. With the advent of this act where private utilities can be involved in producing, transmitting and distributing electricity, there are indications that there will be an explosive growth of such power plants all over the country.

In the range of 10-500 kW<sub>e</sub>, R&D is needed in biomass gasifier-based plants, steam engines, sterling engines, biogas-based gas turbines and even nuclear power. There is a whole array of technologies to be developed so that the power is produced from environmentally friendly and locally available renewable fuels like biomass, solar, wind etc. For young scientists and technologists this is a great technology challenge since the production of electricity and heat for useful purposes from dilute renewable resources requires extensive R&D and creative financial engineering.

On micro scale (< 1 kW<sub>e</sub>) there are exciting possibilities for lighting. For example there are tantalizing indications that new class of materials being researched [can produce 3 electrons/photons](#) thereby providing a quantum jump in the efficiency of solar cells. These type of solar cells together with ultra capacitor batteries (instead of regular lead-acid batteries) can revolutionize rural lighting. <sup>2</sup>

Similarly there has been a quantum jump in the efficiency of thermoelectric elements. These elements can be incorporated into any biomass-based cook stove and about 40-50 W of power can be produced. This power is enough to power a small fan so that the combustion efficiency of cook stove is improved and part of the power can be stored in ultra capacitors for LED-based lighting.

Work is also going on in producing 10-20 W micro engines via MEMS process. These engines can run on ethanol or methanol and hence can eliminate the need for storage batteries. The storage of energy is in the fuel. Thus an extremely efficient decentralized lighting system can be thought of which consists of micro engine powering a CFL or LED lamp.

## Cooking energy strategy

Only liquid and gaseous fuels produced renewably can provide clean cooking energy. Two fuels fall into this category. Liquid fuels like ethanol or biodiesel and gaseous fuels like biogas.

Ethanol is an excellent fuel for cooking and NARI's lanstove and stand alone ethanol stove are examples of this technology development. Field testing of [ethanol stove](#) has given very positive results and almost all the women users compared it very favorably with a LPG stove.<sup>7</sup> However in order that ethanol can be used as a rural household fuel, the presently restrictive excise laws have to be modified. Thus a policy change is needed by Govt. of India in this regard.

A clean gaseous fuel that can be produced from the existing biomass sources is biogas. Biogas has been used extensively in rural areas of India for almost 100 years. However it is produced very inefficiently in fixed or floating dome systems and requires considerable amount of cow dung and other nitrogenous material. It is not suitable for a household with less than 3-4 cattle. Besides there are problems of gas production during winter and improper mixing of mixed inputs like biomass, night soil, cow dung, etc. The biogas which is a mixture of methane and carbon dioxide cannot be liquefied and requires very high pressure (> 100 atmospheres) to compress it to enable its use over extended periods.

Thus R&D is necessary in two areas. One is the development of extremely efficient biogas reactors so that the production/unit of biomass inputs could be maximized. The second is to develop appropriate storage materials which could store biogas at medium pressures.

Optimization of biogas production from a reactor requires sophisticated electronic based controls and bio-chemical engineering technology. A small utility can afford to do it whereas for a household it might be too costly. Tinkering around with existing biogas reactors will not solve the problem. A very sophisticated science and technology input has to be brought to bear on the problem for optimizing the biogas production in rural areas.

R&D is being done world over in methane storage and recently experiments have been conducted in storing it at medium pressures (< 40 atmospheres) in hydrates, porous carbon and porous organic structures. There is thus a need to develop low cost storage materials so that biogas could be stored in them for usage in households. New materials developed through nanoscience and nanotechnology can be developed for this purpose. Thus a scenario can be thought of whereby a micro-utility company can be set up in rural areas which will buy locally available raw materials like cow dung, biomass, etc. and will use them in a very high tech biogas reactor to efficiently generate biogas. This gas can then be stored in small cylinders lined with gas absorbent structures and

can be transported to households in a manner similar to LPG cylinders. This will revolutionize the cooking system in rural India.

The use of high technology in lighting and cooking energy can result in considerable economic development in rural areas. Our estimates show that this energy industry can be of the order of [Rs. 40-50,000 crores/year](#).<sup>1</sup> Besides it can potentially create [about 50 million jobs](#) thus bringing substantial wealth to these areas.

However as the course of agriculture gets dictated by increased industrial demands for fuel and electricity production there is a need to debate the food vs. fuel scenario. In that context use of multipurpose crops like [sweet sorghum](#) becomes very relevant. From a sweet sorghum crop one can produce food (grain), fuel (sweet juice from its stem can be fermented to produce ethanol) and fodder (the biogases is excellent fodder for animals). Thus from the same piece of land one can get all these things simultaneously. No other crop can do this. Our Institute NARI introduced this crop in India in late 1960s and was a pioneer in its development.<sup>8</sup>

There is also a need to develop a whole plant approach where every part of crop should be utilized for human consumption. The production of biogas, ethanol or fertilizer from agricultural residues requires extensive R&D and has a potential of converting farms into food and fuel factories. This can bring in substantial wealth to rural areas and can transform India. To my mind farm and farmers are the backbone of any nation since they can produce food, fuel and wealth from the land. Thus they should be helped both financially and technologically.

## **Agricultural Issues**

We have seen with the above examples that agriculture based energy production has the potential of generating tremendous wealth and jobs in rural India. Thus it is imperative that modernization of agriculture takes place. Presently most of the agriculture in India and other developing countries still exists in stone ages. There is very little mechanization and ancient agronomy practices are used. The problem has also been compounded by the fact that because of land reforms in India the land holdings have reduced thereby restricting the use of existing big and heavy farm machines.

Thus very extensive R&D is required for developing efficient farm machinery for small farms. This requires inputs from very bright young scientists and engineers. Presently all the bright students opt for engineering, medicine, MBA, etc. and so agricultural sciences and engineering do not attract them. Even if you have done engineering in presently fashionable fields like IT, Mechanical etc. you can help by joining companies which can produce good farm machineries. This will considerably help in R&D in this sector and will be your contribution to society.

One of the major problems of farming today is that it is becoming very non-remunerative. Non remunerative nature of farming has come about because of many reasons – the primary being poor support price by the government and resistance of the public to pay proper prices for food products. Secondly a peculiar characteristic of farming is that only 25-40% of the produce is food for which the farmer gets money. The rest 60-75% is biomass or agricultural residue which is a waste and for which the farmer does not receive anything. No industry can survive on the norms of 60-75% wastage. Thus for farming to become remunerative the farmers need to be compensated for the agricultural residues. Our calculations show that on an average a farmer can get an [extra income of Rs. 2000-4000/acre per year](#) for these residues if they are used for energy production. As we saw before these residues can be used to produce electricity and fuel and can contribute substantially in alleviating India's energy crisis.

Since farming is non-remunerative hence farmers' children do not want to get into it. There is a general refrain that farming is not any more a dignified profession and that the sons of farmers are not considered "marriageable commodity"! Besides being uneconomic, farming is also hard work. By developing high technology farming equipment like small combines, harvesters, baling machines etc., it is quite possible that farming can be made less labor-intensive and more attractive to younger generation. As we have seen before, with production of energy from agriculture, farming can also become very remunerative. At the same time if some of you bright engineers from premier institutes go into farming then the rural youth may emulate you. Also very concentrated effort needs to be made by the advertisement agencies to make it glamorous. Once farming becomes remunerative it will also become glamorous!

## **Water issues**

However, for farming to increase so that it can bear the load of food and energy production, adequate water supply has to be assured. To my mind supply of adequate water to rural areas and poor regions of the world is a much bigger challenge than even energy availability, and where you engineers and technologists can play an important role. Not only is there a water shortage, but lack of clean potable water results in millions of deaths every year due to diarrhea.

With the coming of green revolution in India, there has been an extensive use of water, resulting in shortage in some parts of the country. This is despite the fact that there is enough rainfall. Every year India receives ~ 4000 billion cubic meters of rainfall, whereas the present yearly water consumption is only 650 billion cubic meters or 16% of the total rainfall. Thus theoretically we have enough water, but the rainfall is not evenly distributed over India and it comes in short spells, thereby pointing to the need for rainwater harvesting and storage programs.<sup>9</sup>

However, the issues of rainwater harvesting and its supply to the community in rural areas raise a question of who will own the water bodies. This is a touchy issue and quite a few developing countries are grappling with it. I feel there is a need for the local governments to develop policies so that rural water utilities can be set up which can harvest the rainwater, store and clean it and then supply this water to a village throughout the year. These water utilities may also be able to buy water from the government through the existing canal system. Presently, all the water utilities in India are owned by the government and this leads to corruption in supply of water and its very inefficient usage. In 2003, the Government of India passed an electricity act allowing for the first time the private players to produce, sell and distribute electricity anywhere in the country. This act has allowed power producers to break free from the clutches of inefficient and corrupt government power utilities. I feel a similar water act will help in the efficient supply of water to rural areas.

Two most important issues for rural development are water and electricity. NARI has [developed a strategy](#) whereby it is shown that a micro utility producing 500 kW<sub>e</sub> power for rural areas can easily use the heat of the flue gases of the engine to boil or distil water to make it potable. Thus the combined cycle of electricity and water will increase the efficiency of the power plant. Besides, tremendous R&D is also needed in improving the distillation process so that minimum energy is used in effecting it.

I hope these examples have given you a feeling of what you can do to help the rural population. I also hope that these examples have given you a flair of how very sophisticated technology is required for solving the rural problems. The development of technologies can be done through a combined and concentrated effort of academia, corporate sector, S&T NGOs and government labs and where one day you will be leaders.

### **How helping others creates happiness?**

However for an individual to work for the society it is necessary that he/she should be secure and happy. You can only give back to the society when your "personal infrastructure" is adequate. And now I will discuss about how to be secure and happy.

Happiness is a state of mind. You start feeling happy when you become internally secure. [Deep thought or Sanyam](#) helps in creating internal calmness and security. When you become honest with yourself and try to understand yourself deeply you start becoming internally secure.

You are all young. At this age the brain is at its peak. Thus it continuously seeks inputs to process them and without a focus results in jumping from one thought to another. This results in attention deficit disorder (ADD) that we often observe in youngsters. However if you learn through Sanyam or Yoga to focus on a single thought

for a long time then this ability can be used in making the brain very powerful. A powerful brain becomes very innovative and sensitive to the surroundings and propels us to start changing our environment to make it better. This is the genesis of nation building. At the same time this powerful brain or processor can analyze every situation very efficiently and gives us a perspective in life by providing internal security. This in turn makes us less greedy for materials and resources and helps us become sustainable in our lifestyle.<sup>11</sup>

Every citizen of this earth aspires to a decent lifestyle. However with tremendous onslaught of mass media most aspire to have a lifestyle of western nations which is mostly unsustainable. For example, in U.S. the per capita energy consumption is 350 GJ/yr, whereas in India it is a low of 18 GJ/yr. If each citizen of India tries to live an American lifestyle then the whole world's energy resources will be needed only for India. I believe an emotionally satisfying lifestyle is possible with much less energy than is consumed by an average U.S. citizen. Thus an energy consumption of [50-70 GJ/person/yr](#) or one-fifth that of the US, can provide a decent and emotionally satisfying lifestyle.<sup>2</sup> This type of energy consumption will put much less pressure on earth's resources besides reducing substantially the environmental pollution. However it can be possible only if we follow the maxim of "simple living and high thinking".

I also firmly believe that with development of right technologies the lower energy consumption goal can be achieved. As some of you will become good engineers and scientists you can help to achieve it by providing right-sized technologies at the right "price" to the poor. It is a doable goal. What is needed is the desire and will on your part to make the difference to improve the life of poor people.

With the reduction or removal of greed an individual becomes happy. A happy individual can then give back to society both knowledge and resources. This is the essence of environment improvement and nation building. Thus if we all work together for creating happiness in our personal lives and for nation building then India can teach the world a new way towards sustainable living. Also if we make India a happy place to live then we would have automatically solved the problems of 1/5<sup>th</sup> of mankind.

I will end this talk by telling you a story, a tale from our ancient scriptures, the *Puranas*. It is a typical Indian story of a sage and his disciples.<sup>12</sup>

The sage asks his disciples, "When does the night end?" And the disciples say, "At dawn, of course." The sage says, "I know that. But when does the night end and the dawn begin?"

The first disciple, who is from the tropical south of India replies: "When the first glimmer of light across the sky reveals the fronds of the coconut trees swaying in the breeze, that is when the night ends and the dawn begins". The sage says "no".

So the second disciple, who is from the cold north, ventures: "When the first streaks of sunshine make the snow gleam white on the mountaintops of the Himalayas, that is when the night ends and the dawn begins".

The sage says, "No, my sons, when two travelers from opposite ends of our land meet and embrace each other as brothers, and when they realize they sleep under the same sky, see the same stars and dream the same dreams - that is when the night ends and the dawn begins".

I feel that when the bright young scientists and technologists like you will light up the lives of rural population through technology and resources, then it will bring in the dawn of a new age for India and the world.

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[HOME](#)