

## Forum Addresses



## Dr. Ólafur Ragnar Grímsson

President of Iceland

### Sharing Knowledge and Experience: A Celebratory Speech Given on the Occasion of the Centenary of the Conservation of Soil and Vegetation in Iceland

It is with profound pleasure and excitement that I salute your conference and thank the distinguished experts and leaders for making the journey to Iceland. We meet at a time when the erosion of soil and vegetation poses the world with more complex and more difficult challenges than ever before.

Of course, my knowledge of soil science is somewhat limited and I am ready to admit that I have not entirely ploughed through the enormous Encyclopaedia of Soil Science Professor Rattan Lal presented to me when he first came to Iceland. But the Encyclopaedia is still on my table in the Presidential Library, not to be missed by anyone who attends the many meetings I host there, indicating to my visitors the importance for all of us, whatever our position or responsibilities, to understand the science of the soil.

Iceland is indeed a fitting location for our dialogue. Throughout the centuries the harsh natural conditions made life here a struggle for survival, often against impossible odds and all-powerful forces which eventually created the largest desert in Europe.

Medieval Icelandic literature describes how the country was covered with woods from the sea to the mountains, but the following centuries were a story of desertification due partly to overgrazing and exploitative chopping of the woods. The settlers cleared the trees for pastures, used them for firewood and charcoal. Within the first few centuries, about 80% of the original woodland had been cleared and the grasslands of the interior became the desert we can see today. The soil was carried from the highlands down to the lowlands and out to the sea.

It is indeed disturbing when we understand how this process of deterioration came about. The wood was wasted or burned, and due to grazing by sheep and rooting by pigs, seedlings could not possibly be regenerated. In his recent book *Collapse: How Societies Choose to Fail or Succeed*, Professor Jared Diamond discusses the Icelandic case of soil erosion as an illustration of a society that, as it were, chose to fail. The Icelandic experience throughout our early centuries was certainly a case of failure. For far too long the nation failed to appreciate the volatility and sensitivity of the vegetation, failed to understand the combination of factors that contributed to the withering of the soil.

It is tempting to ask: How on earth could this have happened? Were the settlers and their descendants of an exploitative frame of mind? What were they thinking? What is the lesson in the Icelandic journey?

Yes, it may have been a case of failure but our ancestors did not choose to fail. As Professor Diamond does in fact discuss in his influential book our case is a story of people finding themselves in new and unfamiliar circumstances, confronted with difficult problems of land management for which they were not prepared. Of course, there were volcanoes, geysers and glaciers, but Iceland nonetheless had looked similar to the regions in Norway and the British Isles that were familiar to the first generation of settlers who did not know, however, that the soil and vegetation of Iceland were much more fragile than the grasslands they were accustomed to farming. They found it natural to occupy the highlands and bring flocks of sheep there, just as had been done in Scotland. The result was that after the first centuries, Iceland became the country in Europe with the most serious ecological damage.

The Viking immigrants offer us an important lesson. They did not suddenly throw caution to the wind when they settled in Iceland, but they found themselves in an environment which appeared lush but was actually fragile. Their previous experience could not possibly have prepared them for the challenges ahead, somewhat akin to the situation facing the global community in our time.

The conservation of soil and vegetation ultimately became an important issue in my country, a development which began in the last stages of our campaign for independence. Towards the end of the 19<sup>th</sup> century people with foresight and vision understood that special efforts were required. A crucial milestone was the establishment of special agencies for forestry and soil conservation in 1907, created only three years after the Danish Government had agreed to give Home Rule to Iceland, enabling the nation to leave the colonial past behind and establish authority over domestic affairs.

The agencies for forestry and soil conservation were symbols of a new era, reflecting the foresight and determination of the newly self-governing people who resolved to deal with modern challenges in a constructive and responsible manner. The Icelandic pioneers in soil conservation were empowered with energy and vision, courage and determination, and campaigned long and hard to protect the land and halt overgrazing to stop the exploitative utilization.

On this celebratory occasion, I pay homage to the distinguished scientists and officials who have led this effort in Iceland over the last one-hundred years and thank them for the leadership that has enabled the nation to witness success which also entails important lessons for others.

This Forum is therefore both a celebration of a remarkable journey and a manifestation of new ways of thinking: marking the search for methods to deal with global challenges we face here and now and in the decades to come.

It is indeed appropriate to preface our thoughts with reference to the Icelandic experience, for due to the rapidly changing natural environment people around the world are constantly finding themselves in circumstances for which their previous experience has failed to prepare them. Now more than ever, we must channel scientific knowledge and practical lessons into projects of paramount importance, but at the same time appreciate new ways of presenting complex tasks, mindful that our knowledge and understanding are inevitably always imperfect.

This mode of thinking must characterize how we approach the challenges which confront us, how we construct the necessary cooperation. The art of human existence is indeed the art of adjustment. We react to something which was not expected, not even imagined. As Francis Bacon – the great pioneer of modern science – put it some 400 years ago: “He that will not apply new remedies must expect new evils; for time is the greatest innovator.”

In recent years, we have gained increasing awareness of how our eco-world is in fact a single system, how developments in a particular area of the grand mechanism of our existence may hitherto have undreamt-of consequences in another. Perhaps the most dramatic contemporary manifestation of this interdependence is the relationship we have come to understand between climate change and the destruction of the soil, how it constitutes a vicious cycle.

As land loses its cover and vegetation retreats, carbon-capturing capabilities are reduced, accelerating climate change. Warmer years cause significant droughts, affecting water resources and an endless number of ecosystems, often furthering the spread of dangerous diseases. In many cases water reservoirs are disappearing. Enormous lakes – such as Lake Chad on the border between Nigeria, Niger, Cameroon and Chad – have all but evaporated, leaving the land to wither into dust.

The comprehensive nature of the global challenge is coming into ever starker relief, as illustrated by the words of Monyane Molelek, the Foreign Minister of Lesotho, who described how climate change is profoundly affecting the agriculture of his country. He said: “The farmers are suffering because nothing happens when it is supposed to. The traditional rainy seasons are no longer predictable. The numbers of droughts have doubled since the late 1970s and when the rains come, they come in torrents.”

These environmental challenges consequently translate into human conflicts, soil erosion becoming the root cause of humanitarian crises, ethnic confrontation, vicious and tragic. The crisis in Darfur is but one example. In a score of countries, in Africa, Asia and other parts of the world, the deteriorating quality of the land and the enlargement of the deserts threaten to sow the seeds of enormous crises and conflicts in the years to come.

An ever-changing natural environment brings us enormously complex and difficult challenges, demonstrating clearly the imperative need for fresh approaches, new ways in which the international community addresses urgent policy decisions, translates scientific knowledge into improved and more effective ways of solving practical problems. Cooperation is called for more strongly than ever and the sharing of knowledge and experience across national borders is an imperative task.

In the same vein as Iceland is already sharing with others in different parts of the world how to explore and develop clean energy, we are now eager to bring to people in other countries the experience and practical wisdom which Icelandic scientists and public leaders have gathered in the field of soil preservation. If efforts to nurture vegetation and avoid excessive grazing could achieve success in the harsh northern climate, they could surely be effective, for example, in Africa and South Asia, because the Icelandic journey demonstrates that desertification is not only a problem for the tropics.

From the experience of Iceland and the recommendations made at this Forum, we can, together I hope, formulate an Action Programme that could bring renewed enthusiasm to the much-needed global cooperation. We must not wait because time is of the essence. Allow me therefore to suggest some elements of such an Action Programme:

- 1) The expansion of the training programme for experts from developing countries which Iceland has now established, the first trainees being present at this Forum. This programme can enable many to learn from our experience in the same way as more than 300 experts from all over the world have been trained in geothermal energy and fisheries programmes which Iceland has run as our contribution to the United Nations University.
- 2) Encourage the establishment of field laboratories conducting site-specific research on desertification control, providing further training opportunities for researchers and practitioners. One such field laboratory to serve as a model could be located here in Iceland.
- 3) Send scientists and people with practical experience as envoys to locations judged to be of particular relevance, for example to Malawi, Zambia, Ghana and Senegal in Africa, or in the states of Haryana, Rajasthan and Andhra Pradesh in India, or in the lower and middle Himalayas in Nepal. The envoys could bring to these locations new modes of thinking concerning the selection and adoption of land use, and new technologies to restore degraded soils and ecosystems, bringing the projects to the grass-roots level and fostering active participation of the farming communities, by people in villages which are home to more than a billion people the world over.
- 4) Initiate efforts to assess desertification controls and restorative technologies in a range of regions in Africa, Asia and Latin America, as well as efforts to enhance the carbon pool in soils and trees worldwide.
- 5) The creation of a comprehensive system of tradable carbon credits linking it to the monitoring of changes in land use and the ecosystem carbon pool.

- 6) Establish ways to use the income stream generated by carbon trading to provide incentives to restore degraded soils and ecosystems. For such a purpose, we could create what I call a “Desertification Control and Carbon Trading Centre” in order to facilitate scientific exchanges and promote the adoption of new technologies.
- 7) Improve existing programmes for graduate research and create networks of research cooperation in order to foster the growth of a global community of committed scientists.
- 8) Raise the awareness among people and nations of the causes and consequences of desertification and emphasize the benefits of soil preservation to carbon sequestration.
- 9) Encourage the community of scientists and experts all over the world to increasingly collaborate with governments and international authorities, and engage both the private sector and civil society to think in constructive and novel ways. If the four pillars of modern society – scientific communities, governments, business sectors and civic associations – could unite and combine their resources, we can build the foundations for enormous success.

In conclusion, let me emphasize that like the medieval settlers of Iceland, we find ourselves in a new era. Like them, we can neither foresee nor prepare for the unexpected, but must now do our best to improve our understanding and act constructively in new modes of cooperation.

This Forum and others like it can be instrumental in such a process of learning and cooperation and encourage new policies formulated on firm scientific foundations. There are in fact no limits to what can be achieved, but the enormity of our tasks obliges us to combine our resources in order to bring help to where the need in terms of human lives is enormous and urgent.

If we succeed in sharing our knowledge and experience across national borders and with all social sectors, we can indeed create a new beginning.

## Mr. Einar K. Gudfinnsson

*Minister of Fisheries and Agriculture, Iceland*

### Opening Address

Mr. Chairman, Distinguished Guests,

I welcome you to this important gathering here in Selfoss to deliberate on Soils, Society and Global Change. It is a pressing and timely subject. At the same time, we will use the occasion here in Iceland to reflect on our efforts in restoring our damaged ecosystems during the last century.

At the turn of the nineteenth century many things were happening simultaneously in Iceland. Icelanders were reassessing their ties to the Danish state and its monarch, home rule was established in 1904, independence followed in 1918 and the establishment of the republic in 1944.

A law on forestry, including the fight against soil erosion and moving sand, was passed in Althingi on 22 November, 1907. The law marked the onset of systematic public efforts in these fields, although some initiatives had been taken earlier.

Ungmennafélag Íslands, the Youth Society of Iceland, was founded that same year of 1907. Chapters within the Youth Society were formed in all districts of the country. The emphasis was upon cultural and physical education, voluntary work in land betterment through tree planting and revegetation efforts. There was a general awakening. Optimism and commitment to improvement swept the country.

The law on forestry and on combating erosion is therefore closely linked to the resurrection of the Icelandic nation led by Hannes Hafstein, the first Icelandic Minister under home rule. Hannes Hafstein was a visionary and a poet, and galvanised the nation with his vision of improved life. The cornerstone was judicious use of natural resources of land and sea.

His poem Aldamótaljóð, Ode to the New Century, is often cited, especially these two verses:

The time will come, Iceland, when you will arise  
from the depths of the ages, your birthright the prize.  
Your energy will burst forth where hidden it lies,  
your rocks clad once more in growth's colourful guise.

The time will come when the land's wounds are healed,  
the countryside thriving, the moors clad with fields,  
sons harvesting bread that the fertile soil yields,  
culture will bloom in the new forest's shield.

The task was overwhelming. Erosion was rampant following a very cold and difficult century. Only small remains were left of the natural birch forests. They are estimated to have covered a quarter of the land surface at the time of settlement in the ninth century. Overexploitation was still present through the harvest of firewood and increased grazing pressure. The nation prevailed while the forests died.

Icelanders have a long tradition of seeking knowledge in other countries and adapting ideas and processes to national circumstances. It was therefore natural that Hannes Hafstein recruited a Danish forester, Agnar Kofoed Hansen, to shape and lead the new Forestry and Land Reclamation Institute. Kofoed Hansen had wide experience in reforestation, including sand dune containment in the Baltic countries. The experience and successes gained through establishing the windbreaks that saved the western districts of Jutland in Denmark was an inspiration for the work facing the Icelanders.

Kofoed Hansen was keenly aware of the special nature of the Icelandic soils and wrote a remarkable treatise on the loessial characteristics of these soils and their propensity for erosion, and the significance this had for the possibilities of tree growth. He received an offer of an honorary doctorate from the University of Krakow in Poland for this treatise. This is one of the first serious scientific papers on the special nature of Icelandic soils that have received increased attention in later years.

The work of the Forestry Service evolved in two main directions, on the one hand traditional forestry including management and trials with new introduced species, and on the other hand, the tough struggle to halt the extensive soil erosion and sand movement. It was deemed that these tasks would best be handled by two separate organisations; and so it has been since 1914. However, the two sister organisations, the Forestry Service of Iceland and the Soil Conservation Service of Iceland, with common roots in the law dating from 1907, share many goals and aspirations and cooperate extensively on many issues.

The headquarters for the Soil Conservation Service was built in the eye of the storm, literally, at the historic farm Gunnarsholt which had been abandoned because of serious sandstorms that had ravaged the formerly fertile farmland. Black basalt sand filled the air and destroyed the vegetation.

Gap vas Ginnunga en gras hvergi. "There was a great dark void and no grass", to quote the ancient poem Völuspá or Prophecy.

This afternoon and evening, we will visit Gunnarsholt. Our Chairman and Director of the Soil Conservation Service, Sveinn Runólfsson, will be our host and you will witness the transformation of land that was almost completely barren to the productive farmland that it is today.

To restore the whole of Iceland to good farmland that would sustain a productive farming community and growing urban population was the aim set forth at the beginning of the last century. In large districts, this has been successful and the Icelandic people keenly follow the work and successes of this centennial effort.

Energy, dedication, and enthusiasm are but a few of the positive attributes that can be used in praise of the staff of the Soil Conservation Service. There has always been a new frontier mindset and courage to enter new paths to improve on the results in containing the destructive forces of sand movement and revegetate barren land.

Due praise must also be given to the sister organisations that have worked closely with the Soil Conservation Service in research and innovation relating to sustainable land use and land reclamation. The efforts of the Agricultural University of Iceland, and its predecessor the Agricultural Research Institute, have contributed in no small measure to the success of this work. The Agricultural Advisory Service and farmers also deserve recognition for their role in large land reclamation projects. Here the spirit from the Youth Movement is still vibrantly alive.

Lastly, homage is gratefully given to persons and institutes of learning in other countries. Virtually all our scientific staff seeks their education abroad, leading to an exchange of ideas and new approaches. This has significantly impacted the progress made here in Iceland.

It is especially gratifying to be able to reciprocate by introducing this Icelandic model to the international community at this important Forum. We believe that the development of this work in our special environment may hold some interesting features that may be fruitfully employed in many of the developing countries that face the threats of desertification in much the same way as Icelanders did at the start of the last century.

The Icelandic government has decided that development cooperation will play a more significant role in the foreign policy of Iceland in the coming years. Our most successful examples of such cooperation are those where we share our own experience and know-how with countries that are now in a position akin to that which we experienced ourselves almost within living memory of present-day Icelanders.

Through the initiative of the Ministry for Foreign Affairs, a project has been launched in education and training in cooperation with developing countries. We wish to share our experiences with others who find themselves in a similar position as Icelanders at the beginning of the twentieth century. This model in development cooperation has been successfully applied in the fields of fisheries and geothermal energy utilisation.

It is therefore with a particular pleasure for us today to welcome a small group of young professionals from five countries that are taking part in a training course in soil conservation. This is a first small step towards a fully-fledged training programme that may within a few years become part of the United Nations University and the family of capacity-building programmes.

I extend my welcome and gratitude to you all for attending and contributing to this Forum. I wish you success with your important work.

## Dr. Rajendra K. Pachauri

*Director-General, Tata Energy and Resources Institute (TERI) and Chairman, Intergovernmental Panel on Climate Change (IPCC)*

### **Honorary Speech Addressed to the International Forum on Soils, Society & Global Change on the Occasion of the Centennial Celebratory Event**

President Ólafur Ragnar Grímsson, Distinguished Forum Participants, Ladies and Gentlemen,

I would like to take this opportunity to, firstly, congratulate you on putting together such an interesting programme and second, to congratulate you on the one hundred years of soil conservation that has been achieved in this country. I am delighted to have been invited to share with you a few concepts that I hope will be of some interest, particularly given the manner in which we are facing the threat of climate change in this world.

It's really no coincidence that in most languages of the world you will find that the term "earth" is used to describe a fistful of earth just as it is used to refer to this planet Earth. And this, I think, is reflective of the fact that when we talk about soil, when we talk about earth, we are essentially talking about the health of this planet as a whole. As we've seen from history, from all that human society has been through, those societies which did not take care of the earth and which did not promote stewardship of the earth ran themselves into a state of ruin. Based on what we have heard at this Forum, I think stewardship of the soil is really one of the most landmark challenges that we are facing in society today. This challenge has become even more complex in today's world because now it's not merely a question of soil and its stewardship, though these are very important issues. It is because now there is a whole other range of factors that will influence and have an impact on the quality and health of the soil. And it's necessary for us to look at these drivers of change and how they will impact the quality of soil in the future. This most certainly includes how humans are influencing the atmosphere of this earth. Because of the changes that are taking place in the composition of the air we breathe, and the consequential changes that are occurring to the climate, these actions will obviously also have a major impact on the quality of the soil.

During the Forum, references were made to ecosystem services, and we can all agree that these are indeed a complex system of all forms of life: animal, plant and micro-organisms. If we affect one part of this balance, then clearly we will create an imbalance all around. It's also true that the poor in this world are critically dependent on ecosystem services. Looking at the example of my native country of India, where we have widespread poverty despite the impressive economic growth of recent years, one knows that, for instance, when looking at the lives and livelihoods of the poor, nearly an estimated one-third of the goods and services that the poorest of the poor depend on come directly from diverse ecosystems. Therefore, if the ecosystems are degraded, then so are the livelihoods and the lives of these people who are already considered among the poorest in the world.

During this important and timely Forum, it has been proposed that the IPCC be asked to carry out an assessment of climate change and soil and land degradation. As an individual of the IPCC, I am in favour of such an initiative as it would have major impacts for the future of this planet. As a scientific body, I think it would certainly be of great relevance to carry out such an assessment, but the decision will have to be made by the IPCC plenary, and it may be a challenge to gain such acceptance.

Why should we be worrying about climate change, the impacts on soil, and the interrelationship between the two? First, climate change is taking place at an unprecedented rate; and second, this relationship is a subject that has unfortunately not yet received the kind of attention it deserves. We find, for instance, that there really isn't enough site-specific or location-specific assessment of how climate change is likely to impact soil conditions. And there is an enormous wealth of research which necessarily has to be made use of. I would like to take this opportunity to highlight some of the critical changes that are taking place with the earth's climate, which would benefit from very detailed investigation in terms of the impacts on soil and soil quality.

First, I would like to emphasize the authenticity of the three IPCC Working Group Reports. These are based on solid, observational evidence, and not just theoretical studies or modelling activities. It is from these reports that we can begin to come up with an analysis that is profound and solid. For example, we know that 11 of the 12 warmest years in recorded history have taken place in the last 12 years. If we look at the average surface temperature of the earth for a period of approximately 150 years, we find that warming is now accelerated, and it is during the last 12 years that we have had the hottest period in recorded history. In the 2007 IPCC assessment, average temperature increase during the 20<sup>th</sup> century has been at 0.74 °C, as opposed to 0.6 °C which was reported in the previous assessment of 2001. Sea level rise has increased to approximately 17 cm during the last century, and one might be tempted to say that this has no implications on soil quality. However, in actual fact, it does. Given that a large part of the earth is bounded by the ocean, including large nations with long coastlines, sea level rise will have a profound impact on these nations, their soil, and ultimately their people. The intrusion of sea water further inland is taking place at a very rapid rate, and this clearly has implications for soil quality and the salinity of soils. This is something that we must project for the future and use our knowledge to assess the implications, because this will certainly alter human activities in a profound way.

As far as precipitation is concerned, this is also something of extreme value to soil quality. The IPCC observation and assessment for the future is that precipitation will increase in the temperate regions of the world, but is decreasing and will continue to decrease in the subtropics and tropics and the Mediterranean region, though this will not occur uniformly. Observations, along with supporting evidence, show that extreme precipitation events are also increasing. Though it's not

possible to link any single event with human-induced climate change, aggregate data across the globe and over a period of time shows that these extreme precipitation events are becoming increasingly common, and certainly more severe. This obviously has major implications for the health of soils across the world.

We also know that floods and droughts are going to become more common and more severe, and this means that a lot of good quality soil is going to be washed away. It also means that during periods of drought, we can expect a decline in soil quality and changes in the micro-flora that exist in the soil. All of this will have many important rural, social and political implications. We can look at the current situation of Australia as an example: the fact that they have had a drought for the last 6 or 7 years has now entered into the political arena. On my recent visit to Australia, it was evident how much the national psyche has been influenced by the prolonged droughts that have taken place. It has now become an extremely important political issue.

My main concern lies with food security, as climate change intensifies other stresses. We know that there is growing water scarcity in several parts of the world, a growing decline in terms of soil quality and its productive capability, and climate change-induced impacts in terms of a decline in crops and their productivity. All of this is cause for great concern because several studies, as reported through the IPCC Working Group reports, clearly indicate that prices of food grains will go up with temperature increases induced by climate change. This means that the poorest countries in the world, and there are over 50 countries in the world that must import large or significant quantities of food in relation to their own consumption, may not be able to afford the import of enough food grains in the future. We are therefore on the verge of a process that will lead to a major human crisis and a series of serious global crises, threatening not only food security, but human security as well.

We are already in the midst of witnessing the impacts of lost soil quality in conflict situations around the world. For example, it can be argued that the breakdown of the social order and the system that existed in Afghanistan has strong roots in the decline of soil quality and agriculture in that country. In large areas, the quality of the soil has declined to a point where it can no longer be used to grow good crops. The conflict in Darfur revolves around many of the same issues. We therefore must concern ourselves with stemming the root cause of the problem in order to prevent further crises from occurring. A meeting of this broad nature is particularly important because, by definition, specialization means knowing more and more about less and less. At the same time, we are living in a world where everything is interconnected with everything else. When knowledgeable people from different disciplines come together, they bring with them their depth of knowledge of their particular fields. By linking this knowledge across in terms of its entirety, perhaps it will be possible to come up with policies and initiatives that may be able to save the future of humanity from a disaster, which will be inevitable if we don't take enough action.

On the issue of climate change, Article 2 of the UN Framework Convention on Climate Change states the ultimate objective of the Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the earth's climate system. The term "dangerous" includes actions that would threaten the ability of ecosystems to be able to recover on their own from the impacts of climate change. My main concern is that "dangerous" is not something that can be applied uniformly across the globe. It is not a scientific understanding and it is not a scientific term; it is something that has to be based on value judgments. However, these value judgments will vary depending on conditions that exist in different parts of the world. We need to concern ourselves with the impacts of human-induced climate change on soil because if soils in different parts of the world reach a level where they become unproductive, as we are already seeing today, then dangerous levels of climate change will render the situation even more dangerous for some communities.

I would like to conclude with a few thoughts. If one looks at future projections of climate change, as the IPCC has done in its 4<sup>th</sup> Assessment Report, we have 2 sets of so-called "best estimates"; one at the lower range of future scenarios, which estimates global temperature to increase by approximately 1.8 °C by the end of this century; and the other, at the higher end of future scenarios, where global temperature increase is estimated at 4 °C by the end of this century. Either estimate, combined with the 0.74 °C increase that has already taken place in the last century, clearly provides an assessment of the direction in which we are heading. If we are to prevent any dangerous situation from occurring to the soil across different parts of the world, then we need to stem this increase in temperatures and the subsequent disruptions to the climate system that go along with it. It was very encouraging to hear during this Forum about the importance of carbon sequestration in our ecosystem. Ecosystems have lost a lot of carbon, and I think this is a major challenge for human society, as well as the scientific community. How do we begin recuperating some of this carbon that has been lost? There are also economic implications involved, and this may provide a basis for developing a new paradigm. I believe there's also a need to start looking at the possibility of growing biomass fuels. Though we may not see oil run out completely, there will be security issues with the supply of oil and subsequently with the price of oil. Given this prospect, it's time for us to use our ingenuity and see how we might be able to grow fuels on the ground. This possibility will only exist if there are soil conditions and enough water available to support it. If human society is to consider the range of possibilities that exist from the complex cycle between soils, photosynthesis, and the conversion of its products into usable fuels, then we have our challenge cut out for us. I see the potential from the participants gathered here at this Forum to carry these possibilities further.

A successful conference can be measured by two things. First, it can be measured through the range of participants that become involved, from practitioners to policy-makers to scientists, and the linkages that can be drawn between them. The wealth of knowledge that is gathered here at this Forum and that will emerge from it is of extreme value, because it is that which will move us forward. From my own limited experience in the field of climate change, I can see that the world is now waking up and paying attention to this issue, largely due to the amounts of new knowledge available. Without this knowledge, we would have carried on merrily believing our actions are not in any way affecting the climate of the earth. The second element of success is some degree of networking and follow-up action. To fashion an agenda, to come up with a set

of issues that need further research and further intellectual endeavour will certainly succeed in getting the most out of this extremely useful and timely conference.

This is my second visit to Iceland, and I find it to be a fascinating country. It's a great privilege to know his Excellency the President Ólafur Ragnar Grímsson, who I think is a remarkable leader, not only of your country, but I would say of the global community at large. Once again, I would like to extend my congratulations to the Soil Conservation Service of Iceland for one hundred years of extremely successful service to society and to the country, and may I also thank you for giving me the opportunity to be a part of this event.

Thank you.

## Food and Agriculture Organization of the United Nations

*Address delivered at the Opening Session by Parviz Koohafkan, Director, Land and Water Division*

While there has been formidable progress in increasing food production and economic growth, severe problems of food insecurity, poverty and environmental degradation persist, and are increasing in many areas. Over the past 40 years, per capita world food production has grown by 25%, and food prices in real terms have fallen by 40%. As a measure of this growth, average cereal yields were doubled in developing countries, whilst total cereal production has grown from 420 to nearly 1200 million tonnes per year. There is enough food to feed all the population of planet. However, recent FAO data records show that there are still over 850 million people hungry, a majority of which are women and children. Although there has been progress in increasing the average per capita consumption of food in some areas, there is a considerable problem of availability and access to this food due to poverty. The world clearly is not on track to achieve the World Food Summit (WFS) and Millennium Development Goals (MDG) targets of halving the number of hungry and poor by 2015 in many countries, particularly in Africa.

The battle to achieve WFS and MDG targets on poverty and hunger reduction and sustainable natural resources management will be lost or won in the rural areas. This is because, despite large scale urbanization, extreme poverty continues to be mainly a rural phenomenon. Of the world's 850 million hungry, 95% are concentrated in developing countries, mostly in rural areas. And of the world's 1.1 billion extremely poor people, 75% live in rural areas and depend largely on agriculture, forestry, fisheries and related activities for survival. For the rural poor, globalization and the increasing pressures of large industry, markets, and urban consumers have, on balance, been detrimental. In many places, these trends have forced small producers and farm families out of agriculture, or led them to excessive intensification and specialization, environmental degradation, and increased vulnerability to price fluctuations, the vagaries of weather, and pest and disease outbreaks. Tariffs, subsidies and other trade-distorting policies in developed countries have eroded the market share and revenues of exports by many developing countries. Competition between agriculture and other sectors for natural resources, particularly land and water, land degradation and desertification, loss of biological diversity and genetic resources, and more recent frequency of extreme events, have transformed the availability and use of natural resources, particularly in those fragile and critical ecosystems where poverty and hunger often prevail.

The increasing problems of desertification, salinization and water logging, the scarcity of water and increasing water pollution are clear indications that our ways of managing soils and water are not sustainable. Other examples include the contamination of soil and ground and surface water with nitrates and pesticides, eutrophication of inland and nearshore waters, problems associated with solid and liquid waste disposal and soil erosion and land degradation now common in all parts of the world.

The recent decade has seen the increasing frequency and severity of natural disasters – floods, droughts, landslides and wildfires – as a result of climate change and variability, but also as a result of increasing land pressures and misuse of lands and deteriorating soil quality and protective vegetation.

There has also been a marked decline in investment in agricultural and rural sector development. This has further limited the opportunities available to rural populations and contributed to rural stagnation, particularly in highlands, drylands, and fragile ecosystems in which the majority of the rural poor live. Clearly, a paradigm shift is urgently needed to address these problems. Reducing world poverty is not only a moral imperative and a social good, but it is also a global strategic priority for peace and stability and the survival of our planet.

Agriculture is a critical component of sustainable development and poverty alleviation, particularly in developing countries. Agriculture contributes to the economic, social and environmental priorities of sustainable development and has the capacity to bring solutions to many associated problems including employment generation, economic growth and environmental rehabilitation. It is both a problem and a solution to global socio-economic and environmental problems.

The challenge for future agriculture both in developing and developed countries is, therefore, to identify win-win options whereby sustainable intensification or changes in land use meet the demands of expanding population and economic development while reducing negative externalities of agricultural production and maintaining the goods and services provided by the environment.

Conservation agriculture (CA) is one of the promising options both in developed and developing countries. Conservation agriculture seeks the integrated use of a wide range of crop, soil, water, nutrient and pest management, building on farmer's local knowledge and improved technologies through participatory diagnosis and actions. Such regenerative and conservation-effective agriculture can be highly productive, provided farmers participate fully in all stages of technology development and extension. The Landcare movement, to which Iceland and many other countries have joined, is another successful solution for many biophysical and socio-economical angles of the poverty-environmental nexus. Individual farmers and farming communities come together to take care of their land and environment. Farmers are not just part of the problem – they are also part of the solution.

Balanced land access policies and programmes are needed to promote agricultural development and to protect more vulnerable groups against deepening poverty – particularly in a world where competition for access to resources and efficiency-enhancing land use change are the main drivers of the development process.

Farmers often lack incentives to consider the impacts of their decisions on environmental services. Improved information on opportunities and prices, fair trade and pro-poor policies and regulations can influence farmers' decisions in ways that enhance the environment. Payments for environmental services can increase the incomes of farmers who produce public goods and environmental services. Other poor households may also benefit, for example, from increased productivity of the soils they cultivate or improved quality of the water they drink.

Maximizing benefits and minimizing trade-offs in agriculture and natural resources management will require careful science and innovative institutions. Getting the science right is a critical first step. This requires an understanding of complex ecosystems functions and interactions and the relationships between farmers' actions and their environmental consequences. Understanding the socio-economic motives of small holders and constraints facing family farmers, suppliers and beneficiaries of environmental goods and services, would need a holistic approach where both socio-economic and cultural aspects are considered. Equally important are the institutional innovations needed to link suppliers and beneficiaries.

In conclusion, while the challenges of poverty reduction and sustainable development are formidable, the greater human capacity and ingenuity that brought about industrial and technological revolution would need a social and bio-cultural mindset to allow us to overcome these challenges. With the right policies, investments and political will to reach into poor communities, we can meet the formidable challenges of our century.

## United Nations Convention to Combat Desertification

*Address delivered at the Opening Session by Goodspeed Kopolu, Senior Programme Officer, UNCCD Secretariat*

Recent discoveries have revealed an ancient soil management technique from the Amazon basin, practiced for thousands of years by the original inhabitants of the region before the advent of European explorers. Civilizations there had buried charcoal in tropical soils to make them productive. Their origin first erroneously attributed to volcanic eruptions, these patches of soil horizons known as *terra preta*, or “black earth,” still remain bountiful five hundred years later. The charcoal acts like a coral reef for soil organisms and fungi, creating a rich micro-ecosystem where organic carbon is bound to minerals to form rich soil.

It has now been amply proven, on sound scientific ground, that simply burying charcoal (also known as “agri-char” or “bio char”) in soil is beneficial. The advantages of bio char in agricultural soils are numerous:

- 1) It increases the water holding capacity of the soil.
- 2) It results in the formation of stable humus, which then provides a high and sustainable nutrient holding capacity, thereby increasing crop yield as well as encouraging permanent cropping. This in turn helps decrease the pressure on forests that are being extensively cleared for agricultural use.
- 3) Charcoal accelerates pollutant degradation, thereby neutralizing farm chemical run-off before it enters the hydrosphere, and causes persistent organic pollutants (POPs).
- 4) It reduces erosion by increasing aggregate stability of the soil.
- 5) It mitigates climate change, as charcoal formation during biomass burning is considered the only way that biomass carbon is transferred to long-term pools over geological time scales. Indeed, and more than five hundred years later, biomass carbon is still sequestered in these ancient man-made *terra preta* soils.

Accordingly, such a technology carries a tremendous potential and could represent a suitable alternative for 21<sup>st</sup> century agriculture, which is expected to produce food for billions of people.

This certainly represents one innovative way to collectively tackle the interrelated facets of the problems that confound mankind today, through the application of sustainable land management approaches.

However, whatever work has been done is too compartmentalized and ends up being stacked up in the ivory towers of research institutions. This highlights the fact that the world still sorely lacks a global soil and land protection strategy, despite the fact that soil scientists have long recognized that soil, and more broadly, land, is a valuable, finite resource, and that its sustainable future needs to be assured.

Therefore, unlike air and water, where there have long been monitoring networks in place, there is little information on the state of soil quality.

Nonetheless, statistics have been touted by the International Union of Soil Scientists: Over the last 300 years the average soil loss was 200 million tonnes per year; and in the past 50 years this average has reached 760 million tonnes per year. 6 million hectares in annual loss to soil degradation is irreversible. An estimated 2 billion ha require rehabilitation. The cost of rehabilitation over a 20-year period has been calculated to be about US\$ 213 billion. If not rehabilitated however, the income foregone (over a 20-year period) could equal a staggering US\$ 564 billion. The cost of replacing nutrients lost from arable land in countries of sub-Saharan Africa is estimated to range from <1% to as high as 25% of the national Agricultural Gross Domestic Product for selected countries. It is clear that the poor are most severely affected.

There is therefore a dire need for concerted efforts geared towards determining an optimum balance between short-term economic returns and longer-term investments in improved soil quality for more sustainable production. One in which the central role of soil for achieving the mandates of the Multilateral Environmental Agreements (MEAs) would also be the cardinal point.

Notwithstanding the various national and regional initiatives already underway, this would require a different approach for addressing the sustainable use of soil. In this regard, the UNCCD is best placed to host international and interdisciplinary concerted efforts to place soil at the heart of sustainable development for the following reasons:

- The UNCCD provides an intergovernmental and legal process that facilitates work at the international, regional and national levels with concrete obligations and in the context of an established framework and National Action Plan development at the country level.
- The UNCCD, as an integrated environment and sustainable development Convention, holds considerable potential to address the multi-level causes and consequences of soil and land degradation. This potential would be crucial for the success of any concerted international effort on soil.
- An achievable way forward would be to strengthen the role of science within the UNCCD process; a move that scientists have long been championing.

In this regard, the UNCCD already has extensive global backing, due to the relationship between desertification, land degradation, drought and soil. Also, firm foundations have been laid for developing regional and inter-regional cooperation

and intergovernmental agreements for sustainable land management over the past decade of UNCCD operation. A soil initiative under the UNCCD framework could therefore benefit from the groundwork already undertaken.

Furthermore, meaningful strategic reflection is taking place within the UNCCD. Two Intergovernmental Working Groups that will report to the Conference of the Parties are discussing the direction of the Convention for the next ten years. This provides an important window of opportunity in which to explore the possibilities of developing a global consensus to guide the protection of soil under the UNCCD.

In addition, within this ten-year strategy, the Committee on Science and Technology (CST) is being drastically revamped, effectively answering the call to strengthen the role of science within the UNCCD process.

It is also important to note that we are moving towards Commission on Sustainable Development (CSD) 2008-2009, which has chosen soil, land and water as ground zero to ensure the sustainability of environmental conservation. This has been taken into account in the new UNCCD framework that is currently being forged, thereby providing more reason for soil advocates to act now, and hit the iron while it is hot, as it were, in order to achieve a soil initiative under the auspices of the UNCCD.

A unique opportunity is at hand for this alternative. The UNCCD COP8 is currently underway in Madrid. This Forum can make a decisive contribution on the way forward if the decisions of the Forum in this respect can be relayed to the CST of the UNCCD for inclusion in their recommendations to the COP. This Forum would then have given the much-needed impetus to the establishment of a truly holistic way of addressing the issue that takes the lessons learned from of our forerunners in the Amazon, to place soil at the core of sustainable development, and that puts to use at least some of the 100-year experience in "healing the land", gained right here at our host institution, in the quest for the achievement of the Millennium Development Goals.

Thank you.

## United Nations Convention on Biological Diversity

*Address delivered at the Opening Session by Jaime Webbe, Programme Officer, Dry and Sub-Humid Lands*

The Millennium Ecosystem Assessment has made it clear: over the past 50 years, we have changed ecosystems at a rate never before seen in human history. These changes are disrupting nutrient and water cycling, reducing outputs of food and fodder and posing serious threats to biodiversity. At the same time that ecosystem degradation and biodiversity loss is accelerating, the demand for natural resources is rising, and climate change is placing increasing stress on almost all natural systems.

The links between the degradation of ecosystems and the loss of biodiversity is perhaps most severe when the very basis of production is lost – namely, soil. The detrimental effects of land degradation, soil erosion and desertification on biodiversity and biodiversity-based livelihoods can be seen throughout the world. In Mexico, more than 45% of soils are affected by degradation, while in Zimbabwe, estimates of annual economic losses as a result of soil degradation reach 9% of agricultural Gross Domestic Product.

On the other hand, the conservation and sustainable use of biodiversity has multiple benefits for soil and society. Healthy soil is the basis for many livelihoods, provides a buffer against the negative impacts of global change on water resources, production and nutrient cycling, and represents a significant terrestrial carbon store.

The objectives of the CBD and its legal, policy and practical procedures play an important role in the implementation of activities in support of the conservation of soil biodiversity and the restoration of damaged soils, vegetation and ecosystems. The application of the ecosystem approach, for example, adopts a broad, inclusive approach to the management of all components of ecosystems, including people and biodiversity.

In addition to the ecosystem approach, the programme of work on agricultural biodiversity is scheduled for an in-depth review of implementation at the ninth meeting of the Conference of the Parties. At this time, the links between soil, biodiversity and production will be discussed within the framework of activity 2.1 on the role of soil and other below-ground biodiversity in supporting agricultural production systems, especially in nutrient cycling.

Furthermore, in recognition of the close links between biodiversity and desertification, the Convention has adopted a Joint Work Programme with the United Nations Convention to Combat Desertification towards the conservation and sustainable use of the biodiversity of dry and sub-humid lands. In recognition of the importance of soil to the achievement of the objectives of this programme of work, the sixth meeting of the Conference of the Parties called, through the Global Taxonomy Initiative, for increasing knowledge of the organisms that maintain the soil crust.

The eighth meeting of the Conference of the Parties to the Convention, followed by the twelfth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice called attention to the increasing challenges facing biodiversity at all levels as a result of global change in general and climate change in particular.

As global changes are manifested, it is more important than ever that we turn our attention to that biodiversity which forms the basis of production. Because of difficulties in assessing and monitoring soil biodiversity, the information available on the status and trends of this resource is sparse. Addressing this gap will better enable us to implement climate change response activities in a manner which considers soil biodiversity and all the services it provides.

## United Nations Environment Programme

*Address delivered at the Opening Session by Gemma Shepherd, Programme Officer, Division of Early Warning and Assessment*

Your Excellency Ms. Vigdís Finnbogadóttir, Former President of Iceland;

Your Excellency Mr. Einar K. Gudfinnsson, Minister of Fisheries and Agriculture of Iceland;

Excellencies, Distinguished delegates, Representatives of UN and international agencies, Ladies and Gentlemen, dear Friends and Colleagues;

On behalf of the Executive Director of the United Nations Environment Programme (UNEP), Mr. Achim Steiner, I warmly welcome you to this Forum on Soils, Society & Global Change.

Over the last several decades, increasing human population, economic development and emergence of global markets have driven unprecedented land use and global change, resulting in immense pressure on soil resources. These pressures are projected to intensify further over the next several decades.

Will we cope?

The most dynamic changes have been in forest cover and composition, expansion and intensification of cropland, and the growth of urban areas. However it is not land use change that drives soil degradation as much as unsustainable land use: what matters most is how land is managed. Current land resources can support human needs only if sufficient investment is made in sustainable soil and environmental management.

In industrialized countries the primary concern is due to excess of nutrients and pollutants causing eutrophication, acidification, and soil contamination. Perhaps surprisingly, soil erosion continues to be a problem in Europe and North America, and may increase if rainfall intensity increases with climate change. These problems are being effectively tackled where a combination exists of knowledge, forceful social and economic policy, solid institutions maintaining supporting services, involvement of all parties, and tangible benefits to the land users.

In tropical developing countries, however, it is the lack of sufficient nutrient and management inputs for sustainable land management that is the main concern, leading to soil nutrient depletion, soil physical deterioration and erosion, and soil salinity. In these areas, soil degradation is threatening sustainability of food production and damaging the wider environment through effects on water quality and availability, further increasing vulnerability of already impoverished peoples. Effects spill over into adjacent ecosystems; for example, soil erosion in Kenya over a number of decades has damaged the coral reefs along the coast.

In these situations, major investment in soils is needed to prevent environmental damage. For example, in Africa only 11% of the continent, spread among many countries, has high quality soil that can be effectively managed to sustain more than double its current population. Most of the remaining useable land is of medium and low potential, with one or more major constraints for agriculture. These lands are at high risk of degradation under low input systems. Substantial investment in capacity-building and inputs for sustainable land management will be required to bring about improvements.

Excellencies, Ladies and Gentlemen,

Land degradation is also having global impacts through disruption of the biological cycles on which life depends. The runaway carbon cycle and its impacts on global warming are of utmost concern. Soil is both affected by and contributing to global warming. Soil contains more than twice the amount of carbon currently in CO<sub>2</sub> in the atmosphere, constituting one of the largest sources of carbon in the world. How we manage the global carbon store is critical for our survival.

Good soil management can bring about dual benefits of climate change mitigation and improved adaptation. Improved soil management could mitigate 5-15% of the global fossil fuel carbon emissions. This is significant and at the same time will improve soil quality, food security and the environment, which collectively improve adaptive capacity for climate and global change.

However, perhaps the greatest gains may come from measures to prevent further soil and land degradation. Mismanagement of forest soils, peatland and tundra soils could release massive amounts of carbon and methane into the atmosphere and greatly exacerbate global warming. For example, one-third of all terrestrial organic carbon is peat. In a ranking of countries based on their total CO<sub>2</sub> emissions, Indonesia comes 21<sup>st</sup> if peatland emissions are excluded. However, if peatland emissions are included, Indonesia is already the third-largest CO<sub>2</sub> producer in the world. Strategies such as avoided peatland degradation and deforestation may cost less than one-hundredth of alternative emission reduction strategies and can provide additional adaptation and poverty alleviation benefits.

Land degradation over large areas of drylands, or desertification, is another serious global threat to human well-being and environment. Desertification currently affects between 100-200 million people and threatens the lives and livelihoods of a much larger number – more than one-quarter of the world's population depends on drylands in developing countries.

Desertification and poverty are mutually reinforcing, threatening livelihoods, for example through loss of food and water security, and increasing vulnerability to climatic variability. Desertification impacts are far reaching, affecting urban dwellers and people far from drylands, for example by affecting water quantity and quality for downstream users, through dust effects on human health, and through feedbacks on regional and global climate change. Desertification is already leading to social disruption: over the next ten years, 50 million people are estimated to be at risk of displacement as a result of desertification. People displaced by desertification are putting a new strain on natural resources in adjacent lands and threatening international stability.

UNEP has been fully engaged in soil management for over 30 years, through its partnerships with other UN agencies, governments, and a wide array of stakeholders. UNEP was primarily responsible for preparing the United Nations Conference on Desertification, which was held in Nairobi in 1977, and subsequently played a major role in the negotiating process leading to the United Nations Convention to Combat Desertification. UNEP has, and continues to support the implementation of the Convention through global environmental assessments, the development and implementation of projects, and policy support to regional, sub-regional and national action plans for combating desertification.

In the early 1980s, UNEP contributed to the development of the World Soils Policy, leading to the World Soil Charter, which established a set of principles for the optimum use of the world's land resources, for the improvement of their productivity, and for their conservation for future generations. In the early 1990s, UNEP, in cooperation with international partners, carried out global and regional assessments in order to gain fast and reliable data on the global status of human-induced soil degradation, culminating in the publication of the World Atlas of Desertification. UNEP has continued to develop its assessment framework to respond to the complexity of sustainable land management issues, through, for example, its Global Environmental Outlook assessments and the Millennium Ecosystem Assessment. We continue to develop initiatives to build integrated approaches to sustainable land management; for example, UNEP and the United Nations Development Programme are piloting climate change adaptation in eight developing countries under the One UN strategy.

Excellencies, Ladies and Gentlemen,

The threat to sustainable development posed by soil degradation has been recognized for decades, including by Our Common Future in 1987, the 1992 Earth Summit, and the 2002 World Summit on Sustainable Development. But the fundamental principles of sustainable land management are yet to be translated into globally effective policies and tools. Perhaps most alarming of all is the lack of systematic collection, analysis, and interpretation of scientifically sound data on land health that is directly linked to planning, implementation, and evaluation of policy and programmes for prevention and control of land degradation. Effective responses are still also held back by limited access to information, inadequate institutional capacity faced with complex land use issues, and the absence of broad participation or ownership of the responses.

Therefore, we welcome this Forum, which seeks to raise the importance of sustainable soil management in the global change agenda and promote dialogue between scientists, policy-makers, land users and business interests. We assure you of UNEP's utmost support for this process, and very much look forward to the outcomes of the Forum.

## European Commission, Directorate-General, Joint Research Centre

*Address delivered at the Opening Session by Luca Montanarella, EC-JRC*

Excellencies, ladies and gentlemen,

Let me first of all thank the organizers of the meeting, and particularly Sveinn and Andrés, for having invited the European Commission to attend this challenging Forum. Let me add that I also personally enjoy attending today this Opening Session of the International Forum on Soils, Society & Global Change. I had the pleasure to attend exactly two years ago in this very same room a very successful international workshop on “Strategies, Science and Law for the Conservation of the World Soil Resources” and I’m sure that the meeting of today will be a similar success and will leave a long-lasting sign in the process of achieving soil protection in the world.

We are also here today to celebrate one-hundred years of soil conservation and land restoration in Iceland. This is a particularly important moment for soil protection both globally and in Europe, and therefore this centenary of the Icelandic experience is a good opportunity for taking stock of the lessons learned and the future challenges ahead. Iceland can be seen as a forerunner for what we need to do in other parts of the world. The history of its land teaches us that soil degradation caused by human activities can have very long-lasting impacts and may require centuries for recovery. Indeed, this is the reason for us to consider soil as a non-renewable natural resource, since it takes many generations to re-build the full richness of a well developed soil profile.

But let me go back to the main topic of this Forum: Soils, Society & Global Change. Bringing together experts on these three topics is already an achievement, and Iceland has already proven to be the right place for such interdisciplinary seminars. Soil science alone can achieve only little if not integrated in a wider context of society and global change. There is here the urgent need of opening the soil science community to the outside world of non-soil experts. Only in this way will we be able to substantially improve the effectiveness of soil protection strategies and really make progress towards sustainable soil use at a global scale.

Global change is the major environmental concern in today’s societies. Evidence of the impact of global warming is now visible also to the layman, and is becoming a global political priority. Also in that respect can Iceland be seen as a forerunner, by addressing comprehensive mitigation strategies that also include land restoration as a major component for achieving enhanced carbon storage in the topsoil.

As you know, we are in the process in Europe of defining our common European Union (EU) Strategy for Soil Protection that is very much taking into account the role of soils within the context of global change. Hopefully we will achieve our goal of establishing a European legal framework for soil protection that will allow the European Union to be at the forefront of the countries aiming towards mitigation of climate change.

We will certainly have very interesting and challenging exchanges of opinions and views on these issues that will certainly allow us to come up with some conclusions and recommendations to policy-makers on the way forward for achieving synergies among soils, society and global change for sustainable development and improved human livelihoods. A number of important political appointments are in front of us before the end of the year and this Forum could certainly contribute to stimulating a constructive political debate in these upcoming meetings. I’m thinking particularly of the upcoming Conference of Parties (COP) of the United Nations Convention to Combat Desertification (UNCCD) in Madrid that will take place immediately after this meeting, but also of the next COP of the United Nations Framework Convention on Climate Change (UNFCCC) in Bali that will offer another occasion for delivering ideas and options for policy-makers to debate on.

Let me conclude by wishing you all a successful and productive meeting.

## The Iceland Forest Service

*Address delivered at the Closing Session by Thröstur Eysteinnsson, Deputy Director*

### Miles to go...

This year, we celebrate the 100<sup>th</sup> anniversary of the Law on Forestry and Protection Against Up-Blowing of the Land. Forestry, and in fact soil conservation, had started a few years prior to this law, as part of development assistance from Denmark. For the most part, the Act was drafted by two Danes, a forestry professor and a sand reclamation officer. There was a long chapter on soil conservation in the original draft, which was subsequently omitted by the Icelandic Parliament, with the result that the Act became principally a Forestry Act. It provided for the position of Director of Forestry and under his directorship, forest wardens. The Director also hired a sand reclamation officer, even though it was not stipulated within the Act itself.

For six years, forestry and soil conservation were organised within a single agency, the Forest Service; but in 1914, our ways parted, and since then, forestry and soil conservation have been in separate agencies, sometimes referred to as sister agencies.

For the first half of the 20<sup>th</sup> century, Iceland was a very poor country and poverty can rightly be seen as at least part of the reason for not having done more to both protect woodlands and curb soil erosion. Though that was the case then, this is certainly not the case now. Yet there is still widespread and active soil erosion, large desertified areas, and Iceland is still the least wooded country in Europe.

Most Icelanders profess to support both increased efforts at soil conservation and increased afforestation. However, although public spending for both has increased in recent years, it has not kept pace with the growth of the Icelandic economy. As a proportion of gross domestic product, we are actually spending less on soil conservation and forestry now than we did ten years ago. We're doing more, but we are not doing as much as we could, and certainly not as much as we should be doing.

There is no reason to expect that Iceland's economic situation will continue to flourish as it is doing now. In fact, there is no guarantee that we will not at some point in the future become dependent again on sheep for food and wood for fuel. Those who say that we need an eroded landscape as a tourist attraction or that a few trees will spoil the view are short-sighted. We have the opportunity now to make significant progress in stopping erosion, turning desertification around and reclaiming forest cover. If we do not use this opportunity, then we are behaving not only irresponsibly, but unethically.

Happy Centennial to the Soil Conservation Service from your twin sister. Let us celebrate our achievements of the past century, but let us also use this point in time to renew our determination to do better in the years to come.

In the words of Robert Frost:

The woods are lovely, dark and deep,  
But I have promises to keep,  
And miles to go before I sleep,  
And miles to go before I sleep.

## The Farmers Association of Iceland

*Address delivered at the Closing Session by Sigurgeir Thorgeirsson, Director<sup>1</sup>*

President of Iceland, Mr. Ólafur Ragnar Grímsson; Mr. Chairman; Distinguished guests;

It is an honour for me to be given the opportunity to address this very important Forum and at the same time to forward greetings of congratulation to the Icelandic Soil Conservation Service from the Farmers Association and the farming community, now that this institute commemorates a century of organized land reclamation work in Iceland.

We live in a world of rapid changes, so rapid that it is very difficult to foresee developments, even of the nearest future, not to mention the task of trying to predict what will happen in a decade or so.

But despite all changes and instability, we can rely on one thing, and that is the increasing need of the human race for food. Science will continue to provide us with better knowledge and new technologies to meet future challenges, but we must never forget the fundamental factor in agricultural food production, namely the soil.

At the turn of the 20<sup>th</sup> century, Iceland was among the poorest countries in the world. Life through the centuries had been a constant battle for survival, a battle fought in physical and cultural isolation against harsh natural conditions. A combination of non-sustainable land use and natural factors had resulted in vast degradation of vegetation and soil erosion.

The pioneers who started the defensive work against the destruction in 1907 faced an overwhelming task with very limited financial means and primitive technology. They were driven by idealistic force and determination, and I think it is true to say that idealism, energy and dedication have forever characterized the leaders of the Soil Conservation Service.

Right from the beginning, there has been close cooperation between the Soil Conservation Service and the Agricultural Society and later the Farmers Association. Clearly, these parties have not always seen things with the same eyes, but on the whole there has been mutual understanding of each other's position.

The Soil Conservation Service has in later years placed increasing emphasis on guidance to those who use the land, and at the same time, farmers have taken over much of the field work involved in reclaiming soil and vegetation. This has proved to be a very successful cooperation, and we expect it to only increase, not least if or when the sequestering of CO<sub>2</sub> from the atmosphere becomes an additional goal in land reclamation.

Finally, I congratulate the staff of the Soil Conservation Service on their one hundred years' history of remarkable success. I congratulate you all on this International Forum, which I am sure has been successful, and I look forward to future cooperation.

Thank you.

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<sup>1</sup>Currently with the Icelandic Ministry of Agriculture and Fisheries.

## United Nations Development Programme

*Address delivered at the Closing Session by Olav Kjørven, Assistant Administrator and Director, Bureau for Development Policy*

### From Climate and Poverty Crisis to Opportunities for Sustainable Development

President Grímsson, Distinguished Forum Participants, Ladies and Gentlemen,

The global community will have growing difficulties in maintaining food production, achieving water security or meeting greenhouse gas targets without a major improvement in soil management and restoration of land quality. Indeed, improving productivity of the land and making peace with nature is a challenge we must meet if we are to secure equity and prosperity for the human population in the coming decades. The challenges facing us are enormous. Land degradation and desertification have been a key factor in reducing biodiversity, damaging watersheds, increasing hunger and poverty, and upsetting peace in many parts of the world.

### The Need for Integrated Solutions for Climate Change and Land Degradation

Interacting with these compelling challenges comes human-induced climate change, one of the most complex, multifaceted and serious threats that humanity has ever faced. Indeed, the United Nations Secretary-General Ban Ki-moon has characterized climate change as “the defining challenge of our age”. It is clear that climate change is not only an environmental problem but a defining development and security challenge of our age, interacting with consequences of the vast land degradation and desertification that have taken place in many parts of the world.

We dedicated UNDP’s 2007/2008 Human Development Report to climate change and development, to focus attention not on climate change as such, but on the interaction between climate change and human development.

The Report found that the human costs of climate change have been severely understated. While climate change is a threat to humanity as a whole, it is the poor who face the most immediate and most severe costs. In societies that are living in poverty, climate-related risks force people into downward spirals of disadvantage that undermine future opportunities and undermine the achievement of the Millennium Development Goals. The situation is already dramatic.

Let me give you a few examples:

- If the global temperature rises more than 2 °C, we could see an extra 600 million people in sub-Saharan Africa go hungry, over 200 million more poor people flooded out of their homes, and an additional 400 million exposed to diseases like malaria and dengue fever.
- Both Latin America and Africa can expect to see agricultural productivity decrease by 10-20% by 2080, measured against 2000 potential.
- On average, 1 person out of 19 in a developing country will be hit by a climate disaster, compared to 1 out of 1,500 in an Organisation for Economic Co-operation and Development (OECD) country.

Each and every one of these disasters has long-term negative consequences for human development: malnutrition, missed education, life expectancy. We can now trace the consequences decades after a disaster event. These long-term effects have been vastly underestimated in terms of socio-economic consequences.

There are enormous ethical and equity issues here, and an historical issue of responsibility that we cannot escape. About 70% of the heat-trapping gases that we have been busily releasing into the atmosphere over the last 150 years can be traced back to the rich countries. About 28% of the existing stock can be attributed to middle income countries and emerging economies (but growing rapidly), and only 2% to the least developed countries. And yet, the people in these least developed countries will bear the biggest burden and the biggest impact of climate change.

Going back to our concept of human security, climate change will certainly make it harder for people and states to protect themselves from critical and pervasive threats. Increased frequency and severity of droughts and floods will make it harder for people to grow, find or buy food and find safe and affordable drinking water. Already we are hearing from farmers and communities in places like Bangladesh how the soils have simply vanished from their lands after the recent cyclones. Glacial melting in the Himalayas alone will impact water security and options for food production in large parts of Asia in the coming decades in an area that 2 billion people call home. We know that extreme hardship can contribute to violence and conflict. And if people somehow don’t resort to violence, chances are they will try to go elsewhere instead. To the cities, or to other countries. Migration will increasingly become a de facto climate adaptation strategy for many. This emerging massive threat to human security is already becoming apparent in many countries around the world.

We live in an insecure world where increasing numbers are threatened by a changing climate and other challenges to livelihoods and security, and excluded from opportunities and protection that should be provided by citizenship.

Interestingly, some of the ways to address the climate crisis have the potential of helping us to address the larger challenges of expanding human security.

The current negotiations on climate change are about the kinds of rules that will govern the behaviour of states, companies and citizens in the future. Now, what does a fair global regime look like? I would venture to say that it must somehow come to terms with the fact that emissions from anywhere have real impacts on people somewhere else.

To put it in stark terms, flying to Iceland for this important Forum, under a global rule of law that has yet to establish a price on carbon emissions, is connected to the poor West Africans throwing themselves onto rafts to escape destitution in their countries. We cannot compensate anybody directly. That will never be workable. But we have to set a global price on carbon. The polluter must start to pay. And significant financing for poor countries' adaptation must be worked into the deal. The rules of the game must change.

Responding to climate change in a rational manner that is underpinned by science offers this generation the opportunity to craft a more sustainable future. It would make major inroads in providing energy access to the poor, protecting forests and biodiversity and improving the efficiency of consumption and production without compromising economic growth and progress in human well-being. We have our first best chance, in a way, to make peace with nature, of reconciling the laws governing man and the laws governing nature, of changing the rules of the game, of creating real win-win opportunities that could potentially yield huge benefits.

### **A New Development Paradigm?**

Climate change interacting with other environmental, economic and social factors will, unless abated through aggressive collective action in the coming decades, throw millions of people currently living above the poverty line into misery and destitution. As a part of remediation strategies we should envision:

- Development as empowerment: expanding opportunities for people to solve their problems;
- Environment as opportunity: solving local and global challenges by tapping environmental resources in innovative ways;
- Combining these two into a new powerful paradigm of sustainable development.

In a carbon-constrained world, cap-and-trade carbon markets linked to mitigating climate change are likely to become an extremely important part of financing such win-win opportunities.

The Kyoto Protocol gave birth to an incredibly exciting experiment, namely market-based mechanisms at the global level to address the sustainable development challenge. The Clean Development Mechanism is an innovation in global public policy of the highest order in the sense that for the first time, degrading a global public good, a stable climate system, would have a price at the global level and the polluter would have to pay for the "license" to pollute by investing in cleaner development in other parts of the world, specifically in developing countries. The Clean Development Mechanism is up and running and is already transferring billions of dollars from the North to the South.

There are many limitations, challenges and problems with the Clean Development Mechanisms in its current form. Not least of which are its limitations in terms of contributing to meaningful poverty reduction and restoration of soil and land quality. Nevertheless, it has succeeded in generating billions of dollars for investments in cleaner and more sustainable technologies in the developing world, derived from carbon as a global public good.

Now the challenge facing us is to successfully negotiate a global deal beyond the current commitment period that will allow carbon finance to really go to scale and more effectively provide part of the answer to the global climate change challenge, while addressing critical development needs for developing countries. The Kyoto experience to date demonstrates that this can indeed be done, but it will require important improvements.

One such improvement is to make carbon finance relevant to all developing countries including the poorer ones and to make it relevant to the fight against poverty.

### **Creating a Win-Win Situation for Achieving Multiple Goals**

Paradoxically, one of the greatest opportunities for making climate change mitigation and related carbon finance relevant for poverty reduction may be in marginal rural areas, as found for instance over vast expanses of sub-Saharan Africa, and in the remaining standing tropical forests around the world.

Much of the land that poor farmers and communities try eking a living out of is severely degraded. According to the IPCC reports, in coming decades the combination of rural poverty, land degradation and climate change will greatly exacerbate the vulnerability of poor communities in Africa and many other parts of the world. Adapting to these circumstances is quickly becoming a major development challenge for the countries concerned and for the global development community.

Similarly, poor communities living in or near tropical forests have limited options for making decent livelihoods in the absence of a conducive policy environment that supports sustainable management and use. They have to compete with logging companies and other economic interests based on quick, unsustainable extraction of lumber, minerals and other resources. They too are left more vulnerable and with even fewer options for survival and development once the forest resources are gone.

Interestingly enough, degraded lands and tropical forest areas are precisely the kind of lands that can potentially absorb large quantities of carbon from the atmosphere, and thus contribute to meeting global goals for reducing concentrations of greenhouse gases.

The kinds of efforts that could bring about such a positive climate outcome are the very same efforts that could make a huge difference in the livelihoods and development prospects of poor farming and forest-dependent communities, and at the same time build greater resilience against the unavoidable effects of climate change: programmes of rehabilitating the fertility and productivity of the degraded lands and programmes to protect standing forests. The question is, why aren't such programmes happening already? One major reason is the lack of development finance available for land rehabilitation, particularly for the initial investments, and the lack of incentives for protecting forests. But at least as important are the many issues and problems related to lack of clear rights to ownership and use of the land and forest resources. Poor farming communities as well as individual farmers are shut out of a working, functional legal order where land and forest rights are secured. Many noble development efforts have in the end stranded due to failure to address this issue. On the other hand, recent successes involving transfer of land and resource rights to local communities and smallholders from many parts of the world point to the fact that a change for the better is possible. For example, in Niger, by transferring ownership rights of trees from the state to local communities in an area the size of Britain, the landscape has been transformed over the last two decades to such an extent that forest cover is back, livelihoods restored and vulnerability to droughts reduced.

Carbon finance could help fuel and accelerate such transformations. With the necessary reforms and improvements in the rules governing this market, land sequestration of carbon could become a major investment area in coming years, as could sequestration in standing tropical forests. In other words, carbon could become part of the financial equation for helping address both climate change and rural poverty. What is more, the market would bring the financing directly to those on the ground in need of investment capital. It is essential to create space in the next round of climate change negotiations for this agenda.

The challenge and opportunity lies in building strong coalitions that can help drive change in all the camps of climate change, land quality, food and water security, and rural poverty. The significant potential of the carbon market should act as an incentive for policy-makers to reform law and practice when it comes to land and forest resource rights for the poor so as to ensure that individual farmers as well as communities can succeed in land rehabilitation and forest conservation and in increasing productivity and incomes. This is not an easy challenge, but it is certainly the best chance seen in a very long time for bringing badly-needed development investments to rural poverty-stricken areas.

I thank you for your attention.

## United Nations Framework Convention on Climate Change

*Address delivered at the Closing Session by Halldor Thorgeirsson, Deputy Executive Secretary<sup>1</sup>*

President Ólafur Ragnar Grímsson, Distinguished guests, Ladies and Gentlemen,

We are gathered here today to celebrate the foresight of the leaders of this island nation when they, in 1907, as they were taking their affairs into their own hands after being a part of the Danish Kingdom for centuries, resolved to fight the loss of soil and vegetation and to reclaim what had been lost. Protecting the soil and vegetation and planting trees has since been an integral part of the effort of this nation to protect and create wealth from its abundant natural resources making it now one of the most successful economies.

The pledge from 1907 was renewed in 1974 when Icelanders celebrated 1100 years of settlement on the island, resulting in a major additional effort to reclaim lost soil, protect the remaining natural forests and plant new ones. Studying biology at the time at the University of Iceland and serving on the editorial board of a publication put out by biology and geology students at the University, I found myself with two or three others visiting a young visionary, Sveinn Runólfsson, director of the Soil Conservation Service in Gunnarsholt. His vision for the future touched us all and had a lasting impact on me. Now, thirty years later, Sveinn is still pursuing his dream.

Now in 2007, the leaders of the world find themselves in a similar situation as the leaders of Iceland did in 1907. The Intergovernmental Panel on Climate Change (IPCC) has put the facts plainly on the table and spelled out in unequivocal terms that mankind has already changed the climate and that current policies will result in unacceptable consequences. The IPCC has also demonstrated that the technological solutions are available and that the worst consequences can still be averted if decisive action is taken without delay. Global emissions of greenhouse gases will have to peak within the next 10-15 years and decrease to half of what they were in 1990 by 2050. I am delighted that Dr. Pachauri is with us and will present the best scientific advice available.

Will world leaders arise to this defining challenge of our times? There are every indications that they will. This imperative has the undivided attention now of world leaders. The Asia Pacific leaders are debating these issues in Sydney this week, and the G8 meeting of the five largest developing countries in Heiligendamm in June 2007 resulted in important outcomes. The Secretary-General of the United Nations has taken the unparalleled step of inviting governments to send high-level representation to New York later this month to debate climate change on the eve of the opening of the General Assembly.

All of this activity and more is focused on finding the way forward when the first commitment period of the Kyoto Protocol comes to an end in 2012. The Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in Bali in December 2007 will need to launch comprehensive negotiations to put a new post-2012 climate change regime in place in time.

The next two years will therefore be critically important in the design of this new regime. The UNFCCC Climate Change Talks that concluded in Vienna last Friday lay the groundwork for this major effort. Countries reassessed the big picture and identified the key building blocks for an effective response to climate change.

The issues that you have been debating in this International Forum are highly relevant in this context. Twenty percent of today's global greenhouse gas emissions come from deforestation. The parties to the UNFCCC will complete in Bali a two-year negotiating process on ways and means to reduce these emissions, including through the emerging carbon market, creating direct economic incentives to conserve forests. This challenge will be a part of the future process.

Adaptation to the impacts of climate change will be one of the key building blocks of the post-2012 regime. These impacts will fall particularly hard on countries already affected by land degradation and desertification, making their efforts to meet their development aspirations all the more difficult. The post-2012 regime will need to provide these countries with ways and means to reduce their vulnerability to current and future climate variability and change. Trees and other vegetation play a significant role in this.

Addressing climate change will need unparalleled global effort. Let us hope that today's leaders will arise to this challenge as the leaders of Iceland did in 1907.

I thank you.

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<sup>1</sup>Currently Director, Bali Road Map Support, United Nations Framework Convention on Climate Change.

## United Nations University

*Address delivered at the Closing Session by Zafar Adeel, Director, UNU-INWEH*

Your Excellency, President Ólafur Ragnar Grímsson,

Excellencies, Distinguished Forum Participants, Ladies and Gentlemen:

It is my great pleasure to share some thoughts at this auspicious occasion that celebrates a century of research and successful efforts to meet the challenges of land degradation in Iceland.

This Forum has brought some much-needed focus to land degradation, its impacts on soils and climate change, and consequently the threats to human societies. It is indeed an issue that is of great interest to UNU as an organization.

Over the past few years, it has been increasingly obvious that land degradation is one of the most threatening global environmental challenges. More importantly, our inability to address it adequately threatens to reverse the gains in sustainable development we have seen emerge in many parts of the world. It is a process that can inherently destabilize societies by deepening poverty and creating environmental refugees who can often add stress to areas that may not yet be degraded. Impacts of soil and land degradation are exacerbated by political marginalization of the dryland poor and the slow growth of health and education infrastructure.

We also have mounting evidence that land degradation leads to strong adverse impacts on a worldwide scale. The most common and visible of these impacts are dust storms, typically originating in the Sahara and Gobi deserts and affecting the entire Northern hemisphere. In addition to dust storms, desertification is directly linked to downstream flooding, impairment of global carbon sequestration capacity, and regional and global climate change. These impacts on the natural environment are also linked to societal impacts.

It is also becoming increasingly obvious that our failure as a global community to address this problem partly relates to our inability to formulate effective and successful policies. It is high time that we take action to correct these policy directions and enable developing countries to tackle these challenges through their own scientific research and assessment capacity.

The United Nations University (UNU) has a mission to bridge the divide between the research and policy-making communities in order to address pressing global challenges like desertification. And this is indeed the challenge of today: How can we pull all the strands of this human, social and economic development together in a way that we arrive at success for the people most threatened by land degradation? Addressing land degradation is a critical and essential part of adaptation to climate change and mitigation of global biodiversity losses. UNU has led the argument over the last decade that we must take advantage of such interlinkages in policy formulations.

Ladies and Gentlemen, while we know about and have heard about the doom-and-gloom scenarios, this Forum is about finding a way forward. We have at our disposal today immense human, technological, institutional and even financial resources to overcome this challenge. On the whole, combating desertification and land degradation can yield multiple benefits at local and global levels.

In this context I would like to draw your attention to four joint initiatives in which UNU is taking the lead together with our partners to help mitigate the situation for dryland dwellers.

First, in collaboration with six United Nations agencies, three regional development banks and support from Global Environment Facility, UNU is executing a major initiative to support the evaluation of global environmental benefits achieved through sustainable land management. The initiative, called Knowledge Management from Land (KM:Land), is planning a broad range of regional and global consultations, bringing together project managers as well as sustainable land management experts. In fact, the first of such consultations was held here in Selfoss last week, and we are grateful to our Icelandic colleagues for supporting that exercise.

Second, we are continuing to work with a number of desertification research institutions in Tunisia, China, Syria and Japan to implement an International Master's Degree Programme. Focused on integrated management of dryland resources, it is specifically designed to enhance and mobilize the existing expertise in the region. I am pleased to inform you that the second cohort of graduate students will start this programme next month. One of the graduates of the programme is here at the Forum, and it is encouraging to see her contribution to the science of land degradation.

Third, UNU joined hands with the United Nations Educational, Scientific and Cultural Organization (UNESCO), the International Centre for Agricultural Research in the Dry Areas (ICARDA), and a number of national partners to implement a comprehensive programme on sustainable natural resources management in marginal drylands. The programme, called SUMAMAD, is implemented in eight countries: China, Egypt, Iran, Jordan, Pakistan, Syria, Tunisia, and Uzbekistan. It has helped to bring together a comprehensive assessment methodology for a better understanding of local problems and creation of new livelihoods for local communities.

We are now working with the Government of Iceland to develop an international training programme on approaches to combat land degradation and restore land. This builds on a long history of collaboration to create similar programmes

addressing issues related to management of geothermal energy and fisheries. And such a programme will serve well the vast demands for such training in dryland developing countries.

In closing, I would like to express my gratitude to the many partners in this Forum, who have strengthened this event. I am particularly grateful to the Soil Conservation Service for their leadership on this important topic. I trust that the deliberations and recommendations of the participants will help catalyze a sea-change in thinking about land degradation and what it means to us all. I reiterate to you that these international partnerships are critical for overcoming one of the most threatening environmental challenge of our times.

In conclusion, I would like to express my warm gratitude to the hosts in Iceland for the excellent arrangements for this Forum.

Thank you very much for your attention.

## United States Department of Agriculture – Natural Resources Conservation Service

Address delivered at the Closing Session by Dana D. York, Associate Chief

### Common Ground for 21<sup>st</sup> Century Conservation

Thank you, your Excellency Dr. Grímsson, for your kind introduction. On behalf of the 11,000 men and women of the Natural Resources Conservation Service, including our agency chief, Arlen Lancaster, let me say how pleased we are to take part in this wonderful celebration. We consider our Icelandic colleagues to be a close professional family and would not miss the opportunity to congratulate you on your many impressive accomplishments.

Iceland's establishment of the first organized Soil Conservation Service a century ago is typical of the many "firsts" which characterize your proud national history, including creation of the world's oldest practicing legislative body, election of the first woman Chief of State, and your pioneering use of renewable fuels as a means to gain energy independence. Through these achievements and others, Iceland's people and institutions have influenced the evolution of democracy and conservation worldwide and have earned both our esteem and our gratitude.

Iceland's historic leadership is just one of the causes for celebration today, however. A second is that in coming together in Selfoss as an international community to discuss our planet's most pressing environmental challenges, we have found common ground from which to begin to resolve them. As we commit ourselves to future cooperation on wide-ranging issues, it is perhaps worth taking some time to revisit a bit of the past.

### Soils and Society

Our Forum theme, "Soils, Society & Global Change," could certainly do double duty as the title for a history of US conservation on non-federal lands. Although we began a national programme of soil surveying in the United States in 1899, we did not formalize our Soils Conservation Service – the forerunner of today's Natural Resources Conservation Service – until the mid-1930s, following severe degradation of the American plains during the Dust Bowl era. Failed national policies designed to encourage settlement in the near-west and poor land management decisions taken by individual farmers imperilled our agriculture-based economy and citizens' quality of life. Faced with these threats, soil scientist and agency founder Hugh Hammond Bennett advocated "retracing our steps across the land in an effort to correct past mistakes in the interest of the future" (Bennett, 1939).

Bennett, a visionary sort of fellow, had been laying ground work for the agency well in advance of its creation. He lobbied to establish soil erosion experiment stations and used the results to develop demonstration projects, including conservation plans for participating farms.

But Bennett knew more had to be done, and on a grander scale. He set off on a nationwide speaking tour and went before Congress to ask for additional funding and personnel, but initially without much success. Following a very dark day in April 1935 known as "Black Sunday" because a dust storm in the plains blackened the sky so it looked like midnight at midday, Bennett decided to try again.

Having learned from the weather bureau that detritus from the storm was moving east, Bennett scheduled his congressional testimony to coincide with the duster's predicted arrival in Washington. Here's a description of the meeting from an extraordinary book on this period by Timothy Egan, called *The Worst Hard Time* (Egan, 2006):

"On Friday, April 19, five days after Black Sunday, Bennett walked into Room 333 of the Senate Office Building. He began with the charts, the maps, the stories of what soil conservation could do, and a report on Black Sunday. The senators listened, expressions of boredom on the faces of some. An aide whispered into Big Hugh's ear. 'It's coming.'

So he kept talking.

'Keep it up,' the aide told Bennett again, 'it will be here within an hour, they say.' So Bennett continued, until finally "a senator who had been gazing out the window interrupted Bennett. 'It's getting dark outside.'

The senators went to the window. Early afternoon in mid-April, and it was getting dark. The sun over the Senate Office Building vanished. The air took on a copper hue as light filtered through the flurry of dust. For the second time in two years, soil from the southern plains fell on the capital. This time it seemed to take its cue from Hugh Bennett...

'This, gentlemen, is what I'm talking about,' said Bennett. 'There goes Oklahoma.'

Within a day, Bennett had his money and a permanent agency to restore and sustain the health of the soil."

Two years later, the first local soil conservation district was formed in North Carolina; that district, which includes Bennett's home, just marked its 70<sup>th</sup> anniversary. Its founding was a watershed moment, so to speak, in the history of soil conservation in the United States, as landowners and the government began to share responsibility for conservation on private lands. Government field offices staffed with expertise appropriate to the needs of the county being served were also set up.

Bennett was convinced of the soundness of this approach: "In this democracy," he wrote, "national action to conserve soil must be led by these millions of land users. If they are active and willing participants in such a movement, it will endure; otherwise it will fail." (Bennett, 1939). He also thought participation in our programmes should be entirely voluntary, which it has been to this day.

He was right, of course, about the importance of bringing society and soil science together. Today, there are more than 3,000 conservation districts nationwide which coordinate federal, state, local and private assistance to enable landowners to put conservation on the ground. As a result of this insightful construct, delivery of conservation programmes is connected from policy-makers and funding sources in Washington, DC all the way to individual farmers and ranchers well outside the nation's capital – tailored, moreover, to their specific resource needs and those of the community at large, ultimately providing benefits to all citizens.

More than two-thirds of land in the continental US is in private hands. That equates to more than 1.4 billion acres. Thus, the marriage of local leadership and national objectives has been, and remains, critically important in effecting lasting change for the environment, whether on a single acre or across a landscape. It has also afforded flexibility in programme implementation over the years as science has progressed, funding has ebbed and flowed and particular regions or resource concerns have become greater or lesser priorities.

What began as a fairly narrowly-focused mission set emphasizing soil health has grown into a broader family of authorities, programmes and strategies supporting high-quality, productive soils, clean and abundant water, and healthy plant and animal communities.

### **What Have We Learned, Then?**

In my effort to compress 70 years of activity and policy-making into several minutes, I have perhaps made delivery of our conservation programmes to private landowners appear seamless or without controversy. There have certainly been challenges along the way and periods during which some believed the demand for agricultural production would overwhelm our stated national commitment to conservation; there were times we wondered whether we could have hugely productive lands and a healthy environment. And we have certainly learned many lessons; I'd like to share a few of them with you.

First and foremost, we now generally accept agricultural production and environmental quality as compatible national goals and for more than 20 years have expressed that symbiosis through legislation and appropriations informally referred to as "Farm Bills." This legislation expires every five to seven years. An array of 2007 Farm Bill proposals are currently under consideration by members of the US Congress.

For the most part, the funding and authorities resulting from recent Farm Bills have supported abundant production while also increasing our capacity to get conservation on the ground.

However, it is important to understand that conservation technical assistance, which is our agency's oldest programme and which we consider "the engine of conservation" (Helms, 2005), is authorized and funded outside Farm Bill legislation. Most often, when we talk about our mission of "helping people help the land", we mean providing technical assistance.

More recently, though, we have begun offering financial as well as technical assistance to farmers and ranchers and this has become an increasingly large part of our workload, especially during the last five years. While there can be no doubt that financial incentives facilitate adoption of conservation practices, it is technical assistance that makes them feasible and effective.

So, a second lesson is that financial assistance programmes, whether delivered in the form of cost-share programmes, easements, grants or stewardship payments, can distract us from core planning and other mission-essential activities. And the more specialized these programmes become, the more difficult they are to absorb into our existing administrative and operational structures. We continue to struggle with finding the right balance in delivering technical assistance and financial assistance.

Further, as the number of financial assistance programmes has grown, so has landowners' and partners' confusion, given that there are sometimes only slight variations in programme purposes or payouts, but often widely differing eligibility rules.

These are some of the reasons why agricultural producers told us the 2007 Farm Bill should: simplify and consolidate conservation programmes, for us and our customers; significantly increase conservation funding; support emerging priorities, such as renewable energy research; and, provide direct benefits to beginning farmers and ranchers and socially disadvantaged producers. These proposals are reform-minded, for programmes that are merit-based and market-oriented, to enable us to meet future challenges, to make conservation easier and to be more transparent in our business practices. How and if these proposals will be captured in final legislation is anyone's guess as we still have a long way to go.

I do want to make one final point about the process, though; most years, as the draft legislation makes its way through congressional committees, it typically does so without much notice. This year is proving to be an exception to that rule, as urban taxpayers, organic growers and environmental organizations have tuned into the debate and aren't hesitating to voice their opinions. When President Abraham Lincoln founded the US Department of Agriculture in 1862, he did so saying it was to be "the People's department." This year, "the People" are making sure their concerns and preferences are heard.

## Global Change and the Future

So why is this year different? I'd suggest it's because citizens are riding the crest of the burgeoning environmental wave that has been building worldwide for decades. Voters' active engagement in the Farm Bill process reflects increasing interest everywhere in issues like global warming, food safety and sustainable resources management, among others. They have educated themselves about the linkages between soil degradation and other large-scale environmental problems and they expect their neighbours and leaders to understand them, as well. It makes sense to them that if environmental problems are linked, the solutions probably are, too.

Then what does this global change mean to us as scientists, planners, business people and policy-makers? In short, I believe it empowers us to boldly break new ground for conservation, to go beyond "simply retracing our steps across the land" as Hugh Hammond Bennett said 70 years ago.

But to break new ground, we will first have to break a few paradigms. For instance, in its 2007 assessment of 50 years of soil conservation policy in Europe, the Joint Research Centre of the European Commission noted that "soil protection policies are established when there is a perceived threat to the population" (Montanarella, 2007). This was clearly the case last century in the US and Iceland, as formation of both countries' soil conservation services happened only after threats to lands and peoples became imminent.

But being reactionary in this way will not get us where we want and need to go. We must discipline ourselves to use the powerful tools and expertise at our disposal to think and act more strategically. This is easier said than done in the United States at least, where our funding is allocated annually and we experience the disruptions of elections every few years; but, whenever we can take the longer view, we should.

Wouldn't it be better to improve our current capacity to analyze and weigh the possible outcomes of proposed industrial, agricultural and conservation practices in order to plan more extensively, make better decisions up front and manage risk more responsibly at the outset?

We are already moving in this direction in the United States, under an umbrella programme called the Conservation Effects Assessment Project, or CEAP. With greater government-wide emphasis on measuring performance and as a result of increased scrutiny following substantial funding increases for conservation programmes in the 2002 Farm Bill, we knew we had to strengthen the science base for conservation spending.

CEAP promotes cooperative conservation, including with international partners, since impacts across a watershed cannot be judged in isolation and various parcels of land don't recognize the "public-private" and nation/state labels we assign to them. Establishing a framework for measuring and reporting the full suite of ecosystem services provided by conservation practices is another programme objective; soon, we will be inviting farmers and ranchers to participate in an on-line greenhouse gas reporting registry. Our ability to calculate the amount and value of such services will be paramount as we explore market-based opportunities to encourage investment in conservation.

We know we must also break new ground in how we deliver technical assistance, because our customer base is changing along with technology.

When I joined the Soil Conservation Service 30 years ago, we were taught there is only one way to deliver technical assistance: in person. Yet we have new customers who are only part-time farmers and ranchers, having bought rural properties mainly for recreation. They still desire information, but they want to access it via the internet, late at night or on weekends.

As rural communities acquire broadband and other high-speed communications capabilities, more of our traditional customers are computerizing their operations. So, we must find ways to make virtual services work for both of these groups and our other conservation partners.

We currently conduct soil surveys and other assessments on the web, provide on-line "energy estimator" management tools, and offer both our plants database and field office technical guides electronically, to name a few of our e-initiatives.

Maps and tables for more than 2,300 soil surveys can also be accessed for free on the internet, as can the results of National Resources Inventories, which report on land use and natural resource conditions and trends on US non-federal lands. We have made a good start, but have a long way to go; and, we will need to continuously update and adapt our electronic outreach as technologies change.

But we recognize that we also have other new customers, including some beginning farmers and ranchers, disadvantaged producers and underserved community members who very definitely require the hands-on, in-person technical assistance I spoke of earlier.

How all of us choose to balance the needs of people with the lure and genuine benefits of new technologies will characterize our governments, agencies and partnerships in the 21<sup>st</sup> century.

As we work to find common solutions for common problems, we must take care to leverage the learning of others. We should, for example, adopt international standards for soil science and surveys and conservation engineering to facilitate

information exchange and technology transfer; from the US perspective, we have a lot to bring to the table in those discussions.

But in other areas, such as renewable fuels, we are still building national consensus regarding the way ahead. But we are not discouraged, because we are confident that we can learn much from others' research and practices, including Iceland's far-reaching, energy-related initiatives. We look forward to hearing more about that from you, Your Excellency, when you deliver the "Frontiers of Soil Lecture" at the 100<sup>th</sup> Anniversary Celebration of the American Society of Agronomy in New Orleans, Louisiana, later this year.

### **In Closing**

Clearly, it will take a balanced approach, continued aggressive information exchange and technology transfer, and much innovation to ensure we realize the promise of our common ground for 21<sup>st</sup> century conservation. But there can be no question that we must make the effort, for as the poet and farmer Wendell Berry assured us, "The care of the earth is our most precious and most worthy and, after all, our most pleasing responsibility. To cherish what remains of it, and to foster its renewal, is our only legitimate hope" (Berry, 1977).

Thank you again for including me in this very special gathering. Please plan to join us in 2010 when we celebrate our 75<sup>th</sup> anniversary in Washington, D.C. I hope to see you there!

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