

New challenges for soil researchers in response to the needs of society and the environment

تحول در تحقیقات خاکشناسی در راستای نیازهای جامعه و محیط زیست

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Abstract

Funding for research in natural resources has been shrinking worldwide and has become much more targeted and competitive. Research with no clear short or long-term objectives and well defined beneficial outcome for the stakeholders, region or the state is no longer supported in western countries. Attracting funds for fundamental research, which may or may not contribute to subsequent applied outcomes, is becoming increasingly difficult. New methods of ranking papers, journals, researchers, research institutes and universities worldwide have created a situation that forces researchers to either compete globally or get out of research altogether. Iran doesn't seem to be following this global trend as yet, but it needs to adopt these changes in order to stay in touch with the rest of the world in R&D. With the recent explosion in the number of research higher degree students in Iranian universities we need to re-assess both the way we do research in Iran and the kind of researchers we are training for the country in order not to waste this large human resource and the money spent on their training.

Traditionally people like us who are dealing with soil, which incidentally is the world's most important non-renewable natural resource, were looked at by those in more fashionable or money making fields such as technology, industry, manufacturing, business, economy and commerce as weird scientists who have nothing better to do than playing with the "dirt". For the general public too the term "Soil Science" was so unknown that it was often mistaken with "Social Science". Soil, water and air were just there to be used, reused and misused and scientists in these fields were treated like second class citizens of the academic community in the profit driven world of 20th century. This was, to a large extent, our own fault. Soil scientists in many parts of the world, Iran in particular, have been so detached from the rest the community, inclusive, isolated with little influence on the lives and the thinking of the general public. Books and articles we wrote were for our peers and students, while people on the land did things their own way and were influenced more by technology than by soil scientists. The outcome has been a sever degradation and pollution of our land and water resources.

The connection between our research activities and people on the land is still very weak and we have undersold ourselves to other disciplines and to the general public. We have failed to show that 'soil' is not there just for agricultural production and we are not here just to increase yield per hectare of land at any cost. We as soil researches have far more important missions for the sustainable use of our land and water resources but we have failed to make people see this role. Here are some examples of our failure:

- Soil is by far the largest sink and source of carbon through its OM content, thus soil scientists/researchers should be right at the forefront of the carbon debate and

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the fight against global warming. How many of you young "soil researchers are conducting your doctoral research on soil as a carbon sink/source?

- Soil is by far the largest reservoir of the planet's freshwater (22% as against 1% in all the rivers, lakes, reservoirs and streams of the world put together), yet we haven't been part of the

debate over worldwide water shortage and sustainable use of groundwater. How many of you young “soil scientists” are working on this aspect of soil at a time that the entire world is short of freshwater and billions of \$ are being spent on water research?

- It is the soil, in the form of transported sediment, which determines water and air quality and pollution. How many of you are working in sediment transport and water/air quality fields?

- Soil is where all industrial and municipal wastes, contaminant, pollutant and all other nasties get buried in. How many of you are doing your research on waste dump design, construction and management?

- Soil micro-organisms are the sources of all know microbial products used in medicine, science and industry. Are we doing anything on this?

- We know land degradation caused the downfall of many powerful empires such as Illamite of Khuzestan, the Babylonians and the Pharaoh’s of Egypt. If ordinary people knew of such things, they might treat both soil and soil science with respect they deserve. How many ordinary people know? Probably none.

- Even in “agriculture”, with which we have been closely associated or obsessed with ever since the first school of agriculture opened its doors, we haven’t established our authority or earned the respect of people of the land and governments. Even our colleagues in water and plant sciences and engineers have very low perception of “soil” and “soil science” and allow themselves to make decisions on soil often with disastrous consequences.

Here are some of the things that we have to do:

1. We need to consider ourselves as an integral part of the community of environmental scientists and the guardians of one the most important non-renewable natural resources.

2. We need to take a leading role in important issues such as global warming, carbon emission, carbon sink, freshwater resources, water quality, air quality, garbage disposal, sewage disposal and so on.

3. We have concentrated too much on a discipline-based approach both in teaching and research. We need to learn to work in multi-disciplinary/interdisciplinary environments and interact with other environmental scientists (air, water, plant) as well social scientists who we need to help us sell our research results to people on the land, governments and other stakeholders.

4. We have no idea how to carry out outcome-based research except perhaps in “soil fertility and fertilizer use” where for the past 50 years or so we have single-mindedly been trying to increase yield per hectare so much so that 90% of our agricultural lands suffer from compaction. We need to learn this art and change the way we do research in this country.

5. Soil conservation, land management and sustainable development of land resources have long been recognized as the most important aspect of soil science in the developed world, we seem to give them a very low priority. This too has to change.

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6. We should come out of our safe academic bunker and take our message to the wider community. We need to change our approach and start conducting meaningful research on the sustainable management of the country’s soil resources and be able to sell it to the end users.

7. We should make governments and decision makers realize that they have to come to us for advice, or provide money for research on any issue related to the soils of the country; whether it is to be used for agriculture, industry, building site, dump site etc.

8. We should expand our research into off-farm effects of land management, sediment and chemical transport, which will get us more involved in the fashionable topic of water quality and quantity.

I will expand on these topics in my presentation at the meeting.