Clinical and basic environmental studies in Nagoya University– a medical approach to solve environmental problems

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If global environmental problems are regarded as some kinds of diseases, academic approaches against the disease have been separated into two large fields "diagnosis" and "treatment". In case of global warming, Earth system studies such as the climatological elucidation of global warming and the CO_2 flux estimate to vegetation and ocean belong to "diagnosis" and technical and economical studies such as the development of renewable energies and the introduction of environmental taxes are parts of treatments. Researchers are usually experts in one of the fields of diagnosis or treatment, and there are only indirect one-way relations from diagnosis to treatment.

In the field of clinical medicine, "diagnosis" and "treatment" are tightly connected. Obviously, it is very important to treat patients based on precise diagnosis. Besides, it is also essential to diagnose effects and side effects of the treatment for the patient. However, the indispensable collaboration between diagnosis and treatment has not been developed well in the field of environmental studies.

What does it mean to treat environmental problems?

First, I would like to look back on human history very briefly in the viewpoint of environmental problems. Our ancestors had faced on many "environmental problems in its wide definition" and finally overcome them by many inventions owing to the effort of numerous people. However, as the results of those environmental treatments, new environmental problems always emerged afterward because unexpected traps were hidden behind the treatment of previous environmental problems (Fig.1). The human history can be regarded as the continuous sequences of treatments and occurrences of new environmental problems.

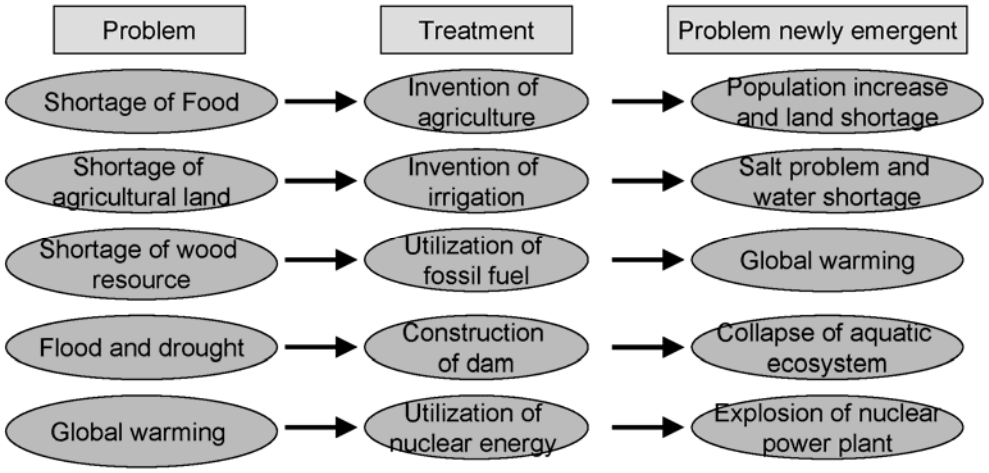

Fig.1. How have human beings treated environmental problems?

To stop the sequential emergence of new environmental problems

To stop or at least mitigate the occurrence of new environmental problems owing to

environmental treatments, we must give new roles to the environmental studies which have ever focused on diagnosis and treatment of the existing environmental problems. That is the prediction of newly emerging environmental problems (Fig.2).

But, how can we predict the newly emerging environmental problems very quickly?

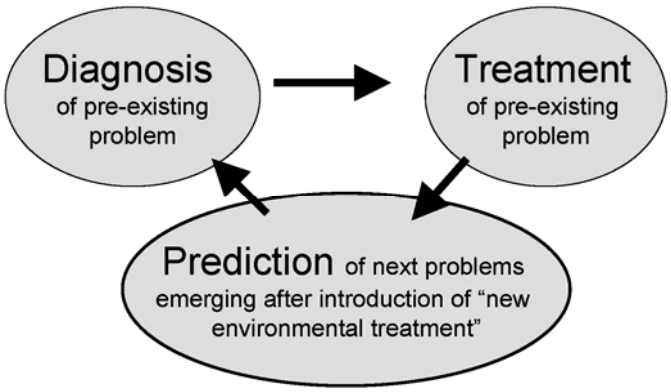

Fig.2. Importance of "prediction" type of environmental studies"

First clue is, of course, to develop our understandings of nature, society and humanity based on each discipline of environmental studies. However, it is obviously not enough for the prediction of newly emerging environmental problems because present academic system divided into narrow numerous disciplines prevents diagnosis experts to know the ongoing environmental treatments and make treatment experts difficult to image side effects of treatment based on the up-to-date diagnosis.

Second clue is, therefore, to exchange the information between diagnosis and treatment experts by sharing of a clinical field of specific environmental issues, corresponding to a patient in clinical medicine. By transferring of precise diagnosis information, an appropriate plan of treatment can be established by treatment experts. On the other hand, by sharing of concrete treatment plans, effects and side effects can be predicted by diagnosis experts. Such a clinical approach in a general hospital must be introduced into the studies of global environmental problems. We are now launching a new educational program for phD students based on this idea in Nagoya University as GCOE program "From Earth Science to Clinical and Basic Environmental Studies" (Fig.3)

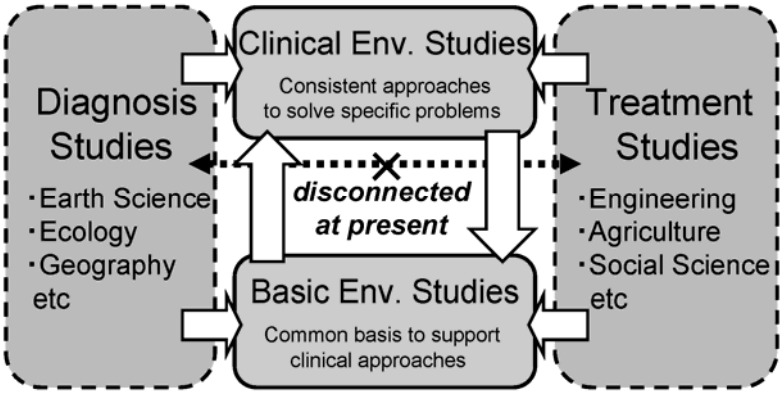

Fig.3. Framework of new environmental studies in GCOE program of Nagoya University

Third clue is to enhance ability of clinical teams consisting of both diagnosis and treatment experts to predict short-term and long-term consequences of specific environmental treatments.

It is the role of basic environmental studies (Fig.3). There is a common mechanism, when an environmental treatment becomes a seed of new environmental problems, such that "high adaptability" of the treatment makes it prevailing excessively in a society and causes a new environmental problem resulting in "low sustainability" of the treatment. On the other hand, a treatment without certain adaptability cannot be accepted by societies. Therefore, any environmental treatments should be designed based on both of "short-term adaptability" and "long-term sustainability", which can be proposed by the progress of basic environmental study integrating of many clinical experiences.

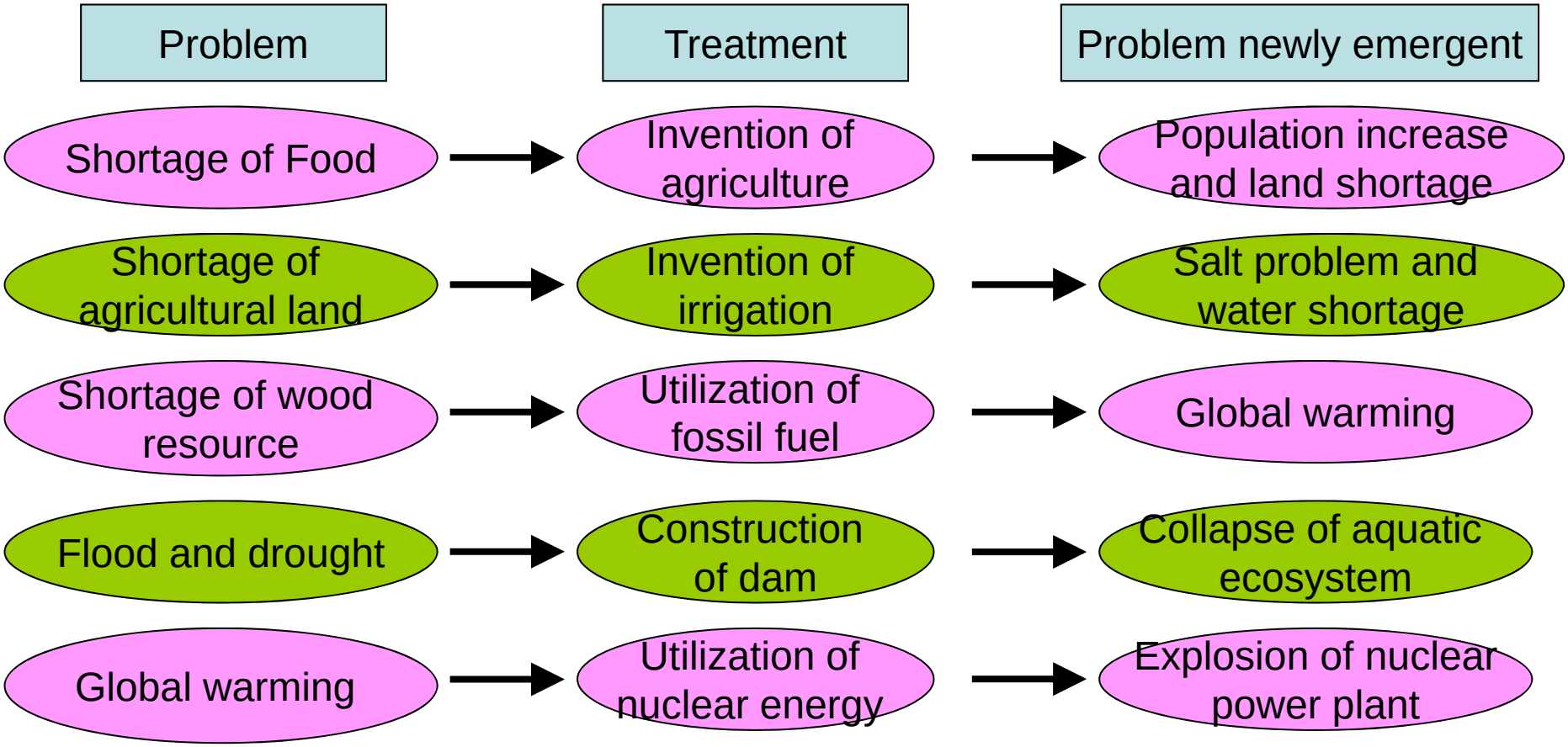
Problem
Treatment
Problem newly emergent
Shortage of Food
Invention of agriculture
Population increase and land shortage
Shortage of agricultural land
Invention of irrigation
Salt problem and water shortage
Shortage of wood resource
Utilization of fossil fuel
Global warming
Flood and drought
Construction of dam
Collapse of aquatic ecosystem
Global warming
Utilization of nuclear energy
Explosion of nuclear power plant

Fig 1.

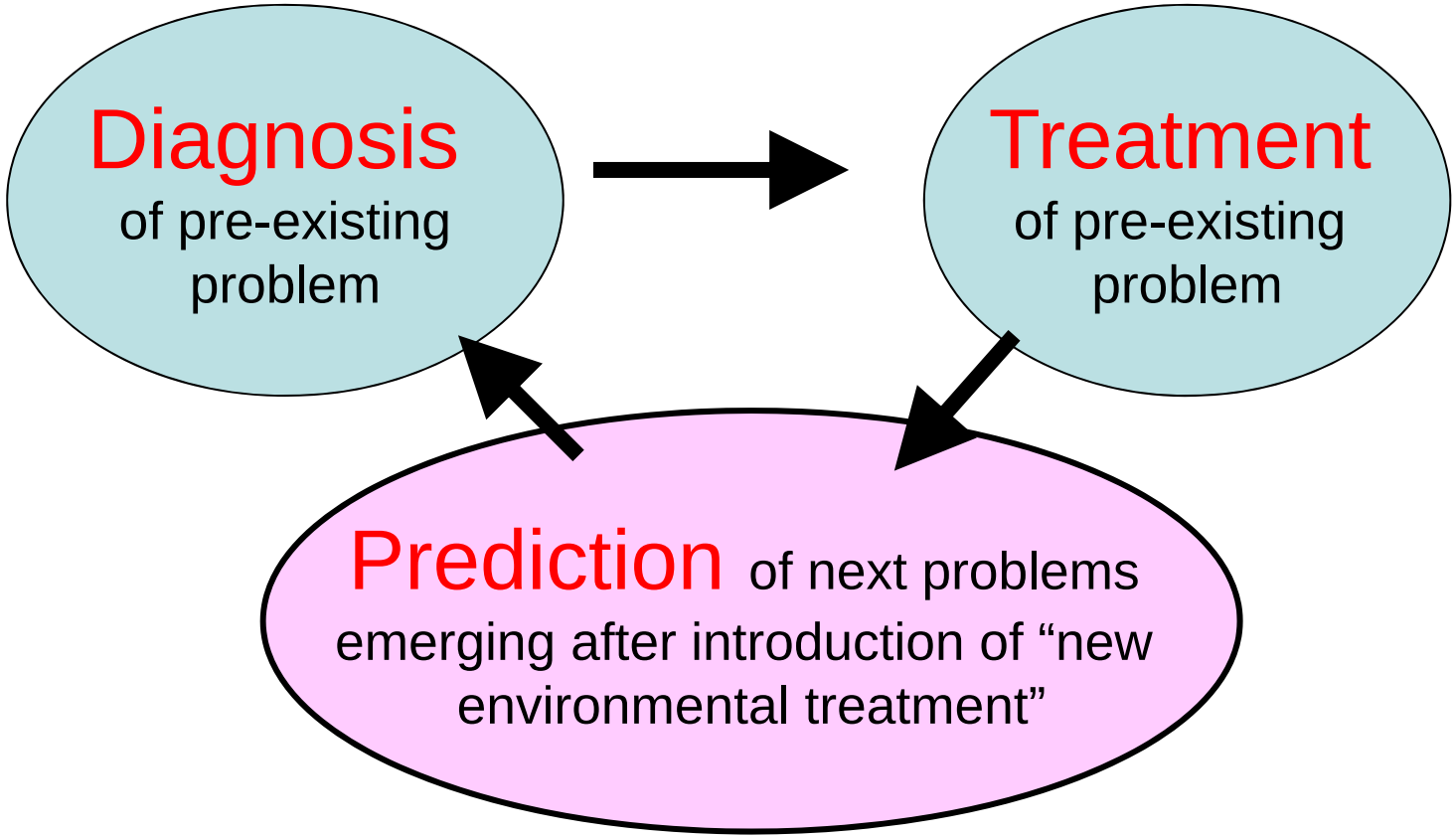
Diagnosis
of pre-existing problem
Treatment
of pre-existing problem
Prediction of next problems emerging after introduction of “new environmental treatment”

Fig 2.

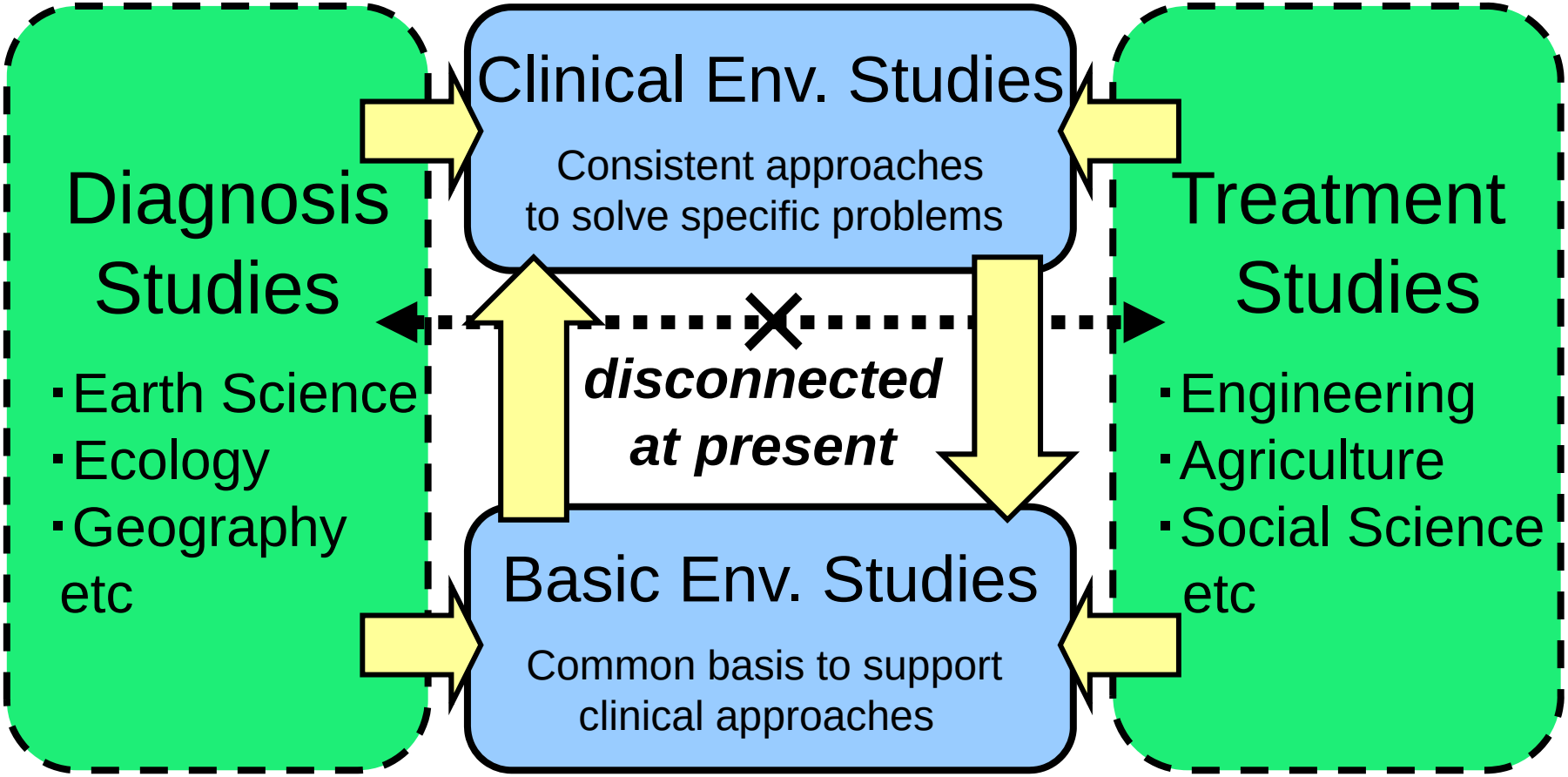
Clinical Env. Studies
Consistent approaches
to solve specific problems
Diagnosis
Studies
Earth Science
Ecology
Geography
etc
disconnected
at present
Treatment
Studies
Engineering
Agriculture
Social Science
etc
Basic Env. Studies
Common basis to support
clinical approaches

Fig 3.