

**ENVIRONMENTAL EFFECTS OF TRADE LIBERALIZATION  
ON AGRICULTURE**

Submission by Japan

**I. MULTIFUNCTIONALITY OF AGRICULTURE**

1. Agriculture is multifunctional, such as preventing soil erosion, landslides and flooding, conserving water resources, preserving bio-diversity, maintaining the landscape and providing recreational space, through sustainable agricultural activities in addition to its primary role of producing food and fibre and providing employment.

2. In regard to the multifunctionality of agriculture, it is stated in the Rome Declaration, paragraph 10 of the "Pledge of Plan of Action 3" of the FAO/World Food Summit that, "we will pursue participatory and sustainable food, agriculture, fisheries, forestry and rural development policies and practices ..., considering the multifunctional character of agriculture". In addition, the Communiqué of the OECD Meeting of the Committee for Agriculture at Ministerial Level pointed out the importance of the multifunctionality of agriculture as being "beyond its primary function of supplying food and fibre, agricultural activity can also shape the landscape, provide environmental benefits such as land conservation, the sustainable management of renewable natural resources and the preservation of biodiversity, and contribute to the socio-economic viability of many rural areas. In many OECD countries, because of this multifunctional character, agriculture plays a particularly important role in the economic life of rural areas".

3. If we are to make agricultural activities sustainable for a long period of time, we need to harmonize agriculture as a whole with the natural conditions where such activities are conducted. If we are to carry out agriculture in a non-harmonized manner, natural resources will tend to be over-exploited, even though a higher yield would be obtained for a short period of time, but would hardly remain sustainable for a longer period of time. Multifunctionality in agriculture has been formed through a long historical process during which agricultural activities have been harmonized with the natural conditions, such as soil and climate, in each region. We should, therefore, not over-simplify discussions on the influences of liberalization in agricultural trade.

4. If we are to take agriculture in the Asian monsoon climate zone as an example, rice production in paddy fields has been sustained for a long period of time in harmonization with its natural conditions in the region. Paddy fields, which are so maintained, have been playing environmentally important roles, for example in controlling floods, preventing soil erosion and storing water in the form of reservoirs.

5. Multifunctionality, which is inherently expressed specific to the natural conditions of each region, cannot be transferred and adapted to other regions, nor be substituted by the expression found in another region. Moreover, it should be noted that landscape and bio-diversity, once they are lost, are impossible or very difficult to recover.

6. With respect to the influences of trade liberalization on agriculture existing in harmony with the natural conditions of each region, these are considered to be expressed differently and in a complex manner, depending on the changes to the harmonized situation brought about by such liberalization. We should thus examine fully how these changes will affect the multifunctionality of agriculture in the long term.

7. One of the changes to the harmonized situation between natural conditions and agricultural activities, arising from agricultural trade liberalization, is that of land utilisation, including the abandonment of agricultural land. Careful attention must be paid over concerns for restoring agricultural land to its original state after devastation, which can be a long and difficult process, and which can seriously aggravate the environment leading to due consequences.

8. The following observation is based upon the result of a study made in Japan with regard to the impact on the environment through the abandonment of paddy fields that have been maintained in a harmonized manner with the natural conditions of the Asian monsoon region.

## **II. THE NATURAL CONDITIONS OF JAPAN (GEOGRAPHIC AND CLIMATIC CHARACTERISTICS)**

9. Japan, located between the Asian continent and the Pacific Ocean, consists of a chain of islands stretching arc-like from the north-east to the south-west. Most parts of the land area consist of mountains and volcanoes. Rugged mountains and hills are interlaced with narrow valleys and, in general, the slopes are steep or precipitous. In addition, heavy rainfall is concentrated over the period from spring to autumn due to the indigenous rainfall conditions in the Asian monsoon region.

10. There are many volcanoes in Japan, and these produce a large amount of volcanic ashes, which are major sources of earth and sand.

11. In Japan, the soil erodes easily and rivers flood quite frequently due to the combination of several natural conditions, such as the substantial rainfall and the short rapid rivers flowing down from steep mountain areas. (See Figures 1 and 2).

## **III. MULTIFUNCTION PERFORMED BY PADDY FIELDS**

12. Paddy fields have a structure to retain large quantities of water. This structure regulates and retains the flow of water from rainfall on the soil's surface and also reduces soil erosion. Paddy fields contribute to lowering the risk of landslides and floods. The ground water is recharged as a result of the absorption of rainfall or the irrigation water in paddy fields.

13. Calculated from the water retention capacity, the water buffering function of paddy fields in Japan would be approximately 5 billion m<sup>3</sup>, which is more than eight times as large as the reservoir capacity of the largest dam in Japan.

14. An investigation on the balance of water in a suburban area of Tokyo (see Figure 3) shows that during the period when paddy field areas were more than 2,000 hectares, less than 1,000 houses were flooded below floor level, that is around 50-60 cm above ground level. In recent years, residential development has rapidly increased and the paddy field areas have consequently declined to below 2,000 hectares, thus more than 3,000 houses have been reported as flooded below floor level and more than 1,000 houses above floor level. The increase in flood damage caused by a reduction in paddy fields shows that paddy fields do actually contribute to the prevention and/or reduction of flood damage.

Figure 1 Rainfall Chart of Japan

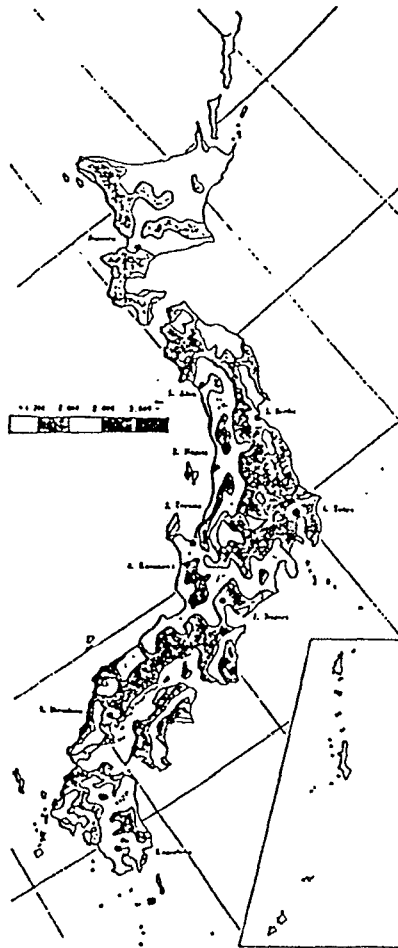


Figure 2 Vertical Curve of Rivers

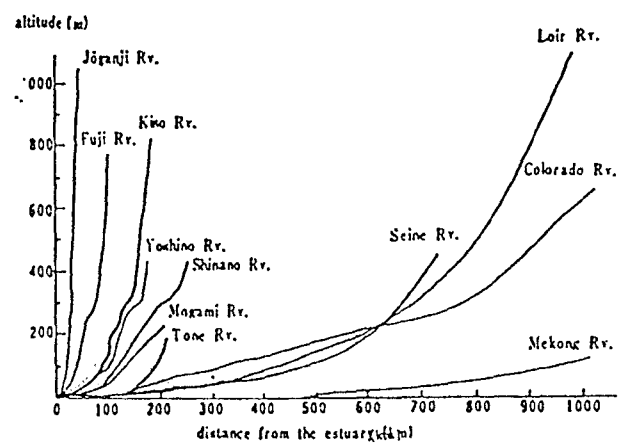
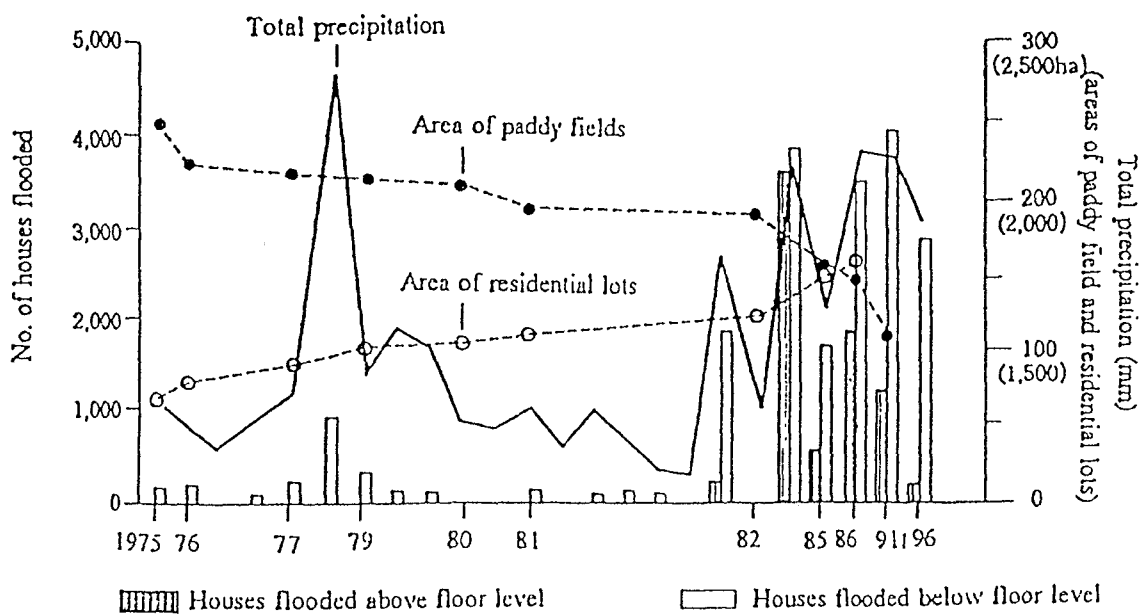


Figure 3 Water buffering capacity of paddy field (Koshigaya, Japan)



15. The Tone River is the longest in Japan with a catchment area of 1.7 million hectares, thus harbouring a major population in its basin. The water buffering capacity of agricultural land in the Tone basin is estimated at being 603 million m<sup>3</sup> (of which paddy fields alone contribute to 522 million m<sup>3</sup>), with the water holding capacity for current agricultural use at 673 million m<sup>3</sup> (paddy fields: 562 million m<sup>3</sup>) and 70 million m<sup>3</sup> (paddy fields: 40 million m<sup>3</sup>) if all agricultural land is abandoned. This volume bears comparison with the total flood buffering capacity of both the flood control dams and flood storage basins along the river (respectively 256 million m<sup>3</sup> and 200 million m<sup>3</sup>).

16. A study indicates that the monetary value of multifunctionality, such as land conservation by paddy fields in Japan, amounts to more than 4.6 trillion yen per year, which far exceeds the total output of rice production at approximately 3 trillion yen per year.

17. The rice production activities on paddy fields provide multifunctionality, such as land conservation, which protects not only the environment, but also economic assets and the whole population nation-wide through the regulation of the water flow and soil loss in Japan from agricultural land to downstream off-farm areas under the typical climate conditions of the Asian monsoon climate region.

#### IV. NEGATIVE INFLUENCE ON THE ENVIRONMENT RESULTING FROM AN ABANDONMENT OF PADDY FIELDS

18. Paddy fields have a structure for storing water through their horizontal surface terraces surrounded by levees or dikes. This structure requires continuous maintenance and, once destroyed, is difficult and expensive to restore.

19. Abandoning the maintenance of paddy fields leads to the collapse of their structure and will cause heavy soil erosion and landslides under the climatic conditions in Japan. The abandonment of paddy fields would lead to the frequent occurrences of landslides and/or floods, which will result in severe damages to, not only agricultural land, but also downstream off-farm areas.

20. The land use and farming practices in hilly and mountainous areas, for example, terraced paddy fields contributes to lowering the risk of natural disasters, such as landslides and floods, to a minimum level in mountainous countries having a topography that is rugged and steep as in Japan. It is a well-known fact that changes in land use enhance soil erosion, and the rate at which soil erosion is increased depends on the type of land use before and after the change. In Japan, it is revealed that the degree of soil erosion sharply increases when terraced paddy fields are converted to other land uses (Figure 4).

Figure 4: Effect of land use changes on soil erosion

Changes in Land Use		Annual Erosion
1989	1995	t ha <sup>-1</sup>
Paddy	Pastureland	11.9
Upland	Pastureland	11.4
Paddy upland	Wasteland	92.7
Pastureland	Wasteland	43.2
Wasteland	Wasteland	10.1
Pastureland	Pastureland	7.2
Paddy	Paddy	2.8*
Upland	Upland	8.3**

\* Including 2 t yr<sup>-1</sup> of soil which was supplied for slope maintenance.

\*\* Including 8 t yr<sup>-1</sup> of soil restored.

21. Environmental degradation caused by the land use changes resulting from the abandonment of paddy fields may be compensated by afforestation. However, it must be noted that soil conditions may not always be suitable for the growth of trees. Also, it requires a certain period of time to create forests under natural conditions, and it means that we cannot expect that a forest will act at preventing environmental degradation immediately. Taking all this into consideration, it should be noted that, in Japan, sustainable rice production activities maintain appropriately the structure of paddy fields and thus prevent natural disasters, such as landslides and floods.

## **V. INFLUENCE OF AGRICULTURAL TRADE LIBERALIZATION**

22. When examining the environmental effects of policy measures on agricultural trade, it is necessary to take into account the fact that the effects may vary from country to country, as well as from region to region, depending on the various natural conditions, such as climate and soil, as well as on differences in agricultural production methods. We should thus evaluate comprehensively the long-term influences associated with changes in production and land utilisation.

23. Agricultural trade liberalization leads to a concentrated production in agricultural exporting countries. As a result, even in these exporting countries, changes in land utilisation, such as the diversion of forestry into agricultural land, may arise in the future. In addition, a regionally-concentrated production that does not fully take into account the natural conditions could take place, which may eventually cause soil degradation, such as salinization. Moreover, the expansion of production is going to require the adoption of certain labour and land-saving technology, such as the excessive use of agricultural chemicals and fertilizers possibly leading to an increase of the environmental burden.

24. On the other hand, as examined above in the case of paddy fields in Japan, agricultural trade liberalization in agricultural importing countries causes the following changes in land utilisation: agricultural land with multifunctionality, which used to be harmonized with the natural conditions, will be abandoned or diverted into land for other purposes, which will eventually cause soil erosion and other environmental impacts, thus in the long term, the environmental burden will possibly become heavier.

25. The impact of agricultural trade liberalization on the environment cannot be discussed just from the viewpoint of the market mechanism and, therefore, we should not ignore the long-term impact on multifunctionality expressed in each region through the agricultural activities in harmony with its natural conditions.

## **VI. IMPORTANCE OF CONSIDERING VARIED CONDITIONS**

26. When we consider the benefits of agricultural trade liberalization on the environment, it is necessary to take into account the fact that the market mechanism does not bring about a proper resource allocation unless externalities on the environment by agricultural activities are reflected on the market price of agricultural products.

27. When the environmental benefits from the multifunctionality of agriculture cannot be internalised, as is often the case, some policy measures are necessary to complement the market mechanism. Agricultural Ministers acknowledged in the Communiqué of the OECD Meeting of the Committee for Agriculture that: "there can be a role for policy where there is an absence of effective markets for such public goods, where all costs and benefits are not internalised".

28. As agricultural trade liberalization itself cannot cope with so-called "market failures", active government interventions are necessary in order to maintain and enhance sustainable agricultural activities which express multifunctionality in each region. Bearing this in mind, we should examine

the appropriate policy measures, taking into account the actual conditions, such as the natural conditions of each country and region, as well as the different agricultural production methods.

29. When we consider the appropriate policy measures for the maintenance and enhancement of the multifunctionality expressed by agricultural activities, it is important to take a realistic approach which will incorporate the varied conditions in each country, considering the results of the agri-environmental indicators being examined in the OECD.

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