

APPROACHES ON CONSERVATION, EXPLOITATION AND SUSTAINABLE USE OF BIODIVERSITY IN VIETNAM

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Introduction

Vietnam is situated in the South-Eastern Asia and has an area of over 33 million ha. It has a typical humid climate that favors the growth of great deal of biological forms. According to its geography situation Vietnam is involved in one of the so called: “centers of origin of domesticated plants and animals.

Vietnam fauna is known of 275 species and sub-species of animals, 1,026 species and sub-species of birds, 260 species of reptiles, 32 species of ambiphious, 500 fresh water fishes, about 2,000 sea water fishes, and dozens of thousands of non-spine fauna. Endemic Vietnamese fauna are numerous, including dozens of mammals, 10 species of birds, 60 fishes, etc. Since 1992, Vietnam has discovered five more species of mammals unrecorded before, namely *Pseudoryx nghetinhensis*, *Meganumtiacus vuquangnesis*, *Pseudonovilos spiralis*, *Canimientiacus truongsoneis* and *Muntiacus piliatensis*.

Vietnam is considered as one of the world ancient animal domestication area. The husbandry animals here include 12 species, namely *Sus scrofa dom*, *Bor taurus*, *Carpa hiscus*, *Ous asies*, *Cervus nippon*, *Rusa unicolor*, *Oryctogalus cuniculus*, *Gallus domesticus*, *Anas boschas*, *Carina moschata*, *Anseranser dom* and *Columba livia dom*.

Roles of Animal genetic resource in food security and poverty alleviation in Vietnam.

At present, indigenous breeds play an important role for country's socio-economic development.

Poverty Alleviation

* **Income earning:** Sale of animals and products (meat, milk, egg, manure, etc.), Create many jobs in rural areas and from that has come more income for the farmers, Crop production using animals for draft power, transport, and manure for maintaining soil fertility, Prize animals such as fighting cock, fighting bull, fancy chickens and birds., Part of agro-tourism such as elephant, etc.

* **Reducing expenses:** Minimum use of chemical fertilizer in crop production, no large investment in purchase of tractor and farm implements, little use of petroleum for farm production.

* **Socio-economic benefits:** Offer productive role for women, children, and the elderly e.g. in pig, poultry and goat due to it links with work in the home, use of animals in religious or traditional ceremonies e.g. use of chickens for ancestral worship, use off animals in sports, shows or recreation such as fighting cock, fighting bull, socio-economic status, loan collateral, other uses such as for dowry or inheritance.

*Food Security

- Major component in crop production e.g. rice production for family consumption: Draft animals power for land preparation and transportation, Animals manure for fertilizer, Utilization of crop residues to produce more foods from animals.

- Increase steady food supplies on family farm e.g. : Backyard chickens provide daily meat and eggs, Duck raising provides eggs and meat, Goats and Dairy cows provide meat and milk, Preserved meat and traditionally processed animal products such as salted duck eggs, dry beef, pork rind..

- Provision of family food assurance in case of crop failure due to natural hazards such as flood, drought, crop pests or diseases

Sale of animals to buy rice or other foods. The different expenses of life: food (a part), clothes, educational fee for children, medicine, weddings, funerals almost all of them come from the income from animal husbandry.

- Prevention of malnutrition (nutritional security) e.g. due to unbalanced protein-energy diet especially in pregnant and lactating mothers and children availability of meats, eggs at village and households.

Livestock production occupies 20% of agricultural output value. The importance of livestock production can be seen from following table and the increase of livestock populations annually

Livestock population in Vietnam from 1990-2001

Year	Buffalo (1000 heads)	Cattle		Pig (1000 heads)	Chicken (1000 heads)	Water fowl (1000 heads)	Goat (1000 heads)
		Total (heads)	Milk (ton)				
1990	2.854,1	3.116,9	11.000	12.260	80.184	23.636	372,3
1992	2.886,5	3.201,8	13.080	13.891	99.627	32.041	312,2
1994	2.977,3	3.466,8	16.500	15.587	99.627	32.041	427,8
1996	2.953,9	3.800,3	22.563	16.921	112.788	38.617	512,8
1998	2.951,4	3.987,3	26.645	18.132	126.361	41.529	514,3
1999	2.955,7	4.063,5	29.401	18.886	135.760	43.563	516,0
2000	2.897,2	4.127,9	34.982	20.194	147.050	50.996	543,9
2001	2.819,4	3.896,0	41.241	21.741	158.037	57.973	569,4

National Statistical Sources 2002

With the development of economy, intensification is increasingly developed to meet the demands of higher living standards of growing population. To do this well, agriculture and rural economy has not only to achieve high growth but also to develop sustainably.

Over 70 indigenous animal breeds currently exist in Vietnam and they generally maintain adapting characteristics to the living environment, which may provide useful or potentially useful

genes or combinations of gene for future needs. For example, prolifically and early maturity, heat tolerance, disease resistant, flavor meat... But many of the breeds are facing extinction or endanger because their performance, food conversion efficiency or lean meat percent are much lower than that of imported breeds and Vietnamese producers are therefore unwilling to keep them.

The Vietnam Government and scientists have applied much efforts to the conservation of animal genetic resources since 1989 and the action plan for sustainable conservation of biological diversity was also established.

This paper is reported the summary of Vietnam's work and future planned and activities in the field of animal genetic resource conservation .

Objectives of Vietnamese conservation program

1. To survey for collecting informative data on physiology, genetic and economic related traits for characterization of native breeds. Developing alternative stocks with characteristics of native breeds for meeting a wide variety of market production condition.
2. To help farmers to in-situ conservation, establish small farms for conservation the species that really endangered.
3. To establish a systematic ex-situ conservation for genetic materials: semen, embryos, somatic cells and DNA samples.
4. To step by step using bio-techniques to analysis animal genetic resources for identifying:
 - The genetic relations within and between breeds for animal classification
 - Economic important traits and unique traits for today and future use.
5. To census, survey existing breeds, exploit unknown breeds for information system
6. Internal and external information exchange.



**Vietnamese Animal husbandry system
Methods for conservation and Utilization**



Endangered I pig breed in Vietnam

- * To keep animal in original habitat: putting financial, technical support for organizations, households managing the animals.
- * Propagation using a small population; if animals have economic traits for improving production performance of exotic breeds, the intercrossing program is used.
- * Data collection on their phenotypic characteristics and analysis genetic polymorphism.

- * Preservation of germ cells with emphasis at sperm and embryo cryo-preservation
- * Building Biodiversity information system and publishing documents.

Achievements of Conservation of animal husbandry genetic resources.

Survey of animal husbandry genetic resources.

Status of 70 % of local animal races has been surveyed. FAO standards are used for race classification as per levels of usage and deterioration. New genetic resources have been found by surveys: Udauriu cattle, H'Mong cattle, Mini pig, H'mong chicken.

In-situ conservation.

- Secure races in pressing danger, facing extinction: Rehabilitation and in-situ conservation of i Pig race in Thanhhoa, Ho Chicken in the Red river delta, Oxen in Nghean, White Horse in Thainguyen, Te Chicken in Laocai, Yenbai, and Bauben Ducks in Hoabinh.

- Maintain races in risky situations: Dong Tao chicken , Bau Quy ducks.

-Maintain races decreasing in quantity: Three races of Pigs, one of Oxen, one of Goats, two of Rabbits, one of Horses five of Chickens, two of Ducks, and one of Geese.

-Creating new products having both high productivity and high quality by crossbreeding between exotic and indigenous breeds. (for example, Dong Tao x Tam Hoang chicken, Mia x Kabir chicken, Co x Bau duck, Mongcai x Landrace pig...).

-Establish information on animal husbandry diversity is given in protection network, including a Web page.

Ex-situ conservation.

-Ex-situ conservation is done at research institutions and at animal raising units for races in extremely risky situation and in need of urgent use. The work has been applied to one race of Pigs, six of Chickens and three of Ducks.

-In-vitro preservation of genetic materials: Semen, oocytes, embryos, somatic cells.

-The genomic DNA samples and somatic cells of 32 native animal and poultry breeds were preserved.

-Animal Molecular Genetic Lab. for genetic study has been established and start studying on DNA polymorphisms.

-Published WEB site and two books on animal conservation.



Conservation network in whole country

Approaches to conservation and exploitation, sustainable utilization of animal genetic resources in Vietnam.

Animal diversity is invaluable treasure for agricultural development particularly and socio-economic development generally. Today, for sustainable development, among natural resources, it is necessary to highly value *animal genetic resources* as much as *land resources* and *water resources*.

Contradicts often appear between conservation and development. An overlook of diversity situation in some developed countries: unawareness of solution to such contradicts and abiding market-oriented benefits have resulted in deteriorated animal biodiversity to the extent unrecoverable. Vietnam has taken such lessons and promoted advanced technologies of the present technological revolution to effectively conserve its own biological resources in order to serve the national socio-economic goals and share the world benefits.

Genetic resources are those of reproduced ones, which can be made more diverse and richer if they are properly exploited. Therefore, in the long term, to minimize contradicts between conservation and exploitation of animal diversity, Vietnam highly respects approaches of conservation through use so as to ensure sustainable exploitation of his own. For genetic resources, conservation usually includes collection, preservation or maintenance, characterization, evaluation and utilization. Some particular approaches are presented as follows.

Social Approaches.

The measures in details are below:

**** Raising community awareness of position and importance of animal biodiversity.***

This can be done by means of:

- Promoting constant propaganda on mass media,
- The conservation should be placed within the framework of a measure towards sustainable agricultural development and food security. Conservation of animal diversity must become a common issue attracting relevant attention when working out policies for agricultural development in particular and socio-economic development in general at all levels from the central to the localities.
- Contents of agro-forestry biodiversity conservation should be introduced to educational programs at different levels, from general secondary education to university in the facilities of agriculture and biology.

**** Linking animal biodiversity conservation to national culture conservation.***

National cultural diversity is a major cause to the animal diversity, which is most obvious in mountainous areas. Therefore, to effectively conserve biodiversity, it is necessary to link it to the cultural conservation. This is suitable to the current direction of Vietnam in rehabilitating and preserving traditional cultures. Practical contents of conservation should be made in details so as relevant policies and measures can be worked out.

****Defining proper economic mechanism and regulation for agro-forestry biodiversity conservation.***

Market-oriented economy is the main factor to decrease animal diversity. It is normally perceived that diversity is linked to backward. But it is perceived by all that this biodiversity decreasing and draining has caused instability in development process and progress making. To preserve animal genetic resources and animal husbandry systems, animal products must possess

economic significance. In detail, outlets for these products must be found. Earlier, man ate and used more objects from flora and fauna than they do now. Variety of foods is the major factor to reinforce health and alleviate diseases. Cut down on food stuffs means dependence on actual conditions and is human habit rather than interests. Therefore, warning of varied foodstuffs, food from fauna to create outlets for products is feasible, which is to seek relevant economic mechanism for animal biodiversity conservation.

****Developing and perfecting legal documents on agro-forestry biodiversity conservation.***

Presently, Vietnam Government issued Decree 07-CP and Decree 08-CP in 1996 on Management of Crop Varieties and Animal Husbandry Races, Decision 845/ TTg in 1995 passed by Prime Minister on Actions for Biodiversity. These are most important documents related to the agro-forestry biodiversity conservation in general and Animal diversity in particular in Vietnam. However, many detailed regulations are needed to bring conservation to order. Defining agro-forestry biodiversity conservation is the task controlled by the Government, requiring relevant investment policies. Vietnam is inclined to improve management, decrease medium agents, avoid overlapping assignments to promote investment efficiency.

Technical Approaches

****Developing the National animal Genebank.***

The National Genebank functions to ex-situ conserve in the long term genetic resources of animal species. Compared to the world and regional levels, facilities for animal genetic resources conservation of Vietnam is left further behind. In the plant, animal genetic resources of Vietnam are facing the risk of draining and seriously being damaged. Therefore, Vietnam needs to raise the issue of establishing National animal Genebank to fulfill the national animal genetic resources ex-situ conservation as the priority as insitu conservation.

****Promoting in-situ genetic resources conservation together with agro-forestry ecological system conservation.***

In-situ conservation is beneficial in that it can maintain genetic resources in natural evolution. Only in-situ conservation can truly preserve the ecological system. Promoting in-situ conservation is the primal measure towards reestablishment of the lost biodiversity. The measures is conserve them in household scale. Conservation units are in villages, communities.

Husbandry animal species facing extinction or needing rapid replication for exploitation.

These are husbandry animals in extinction risk needing special raising, or races of small number, needing rapid replication for exploitation. Ex-situ conservation is applied at research institutions, intensive raising farms or of in-vitro preservation of genetic materials at research institutions.

****Promote research on evaluation and exploitation of germplasm.***

Conservation through use can only be feasible when genetic resources are in mass use. Therefore, Vietnam needs to invest on scientific research on germplasm evaluation and exploitation. The main content of this is to evaluate genetic diversity to identify and detect valuable gene sources. Evaluation of genetic diversity needs implementing research from molecular and agromorphological levels to ecological adaptation. From the evaluation, good animal races can be selected to extend in production.

****Diversity gene pool in animal production.***

This is the most important measure to realize conservation through use of genetic resources is Diversity gene pool in animal production. This work is to promote sustainability of production and efficiency in agricultural environmental protection. Diversifying gene pool in production needs to be made through detailed agro-promotion missions in the national agriculture extension policy.

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