



SDC Swiss Agency for Development and Cooperation - East Asia Division

EDITORIAL

The Asia Briefing Paper Series aims to inform the development practitioners and the (Swiss) public about new innovations, results and impacts of Swiss development cooperation in Asia. It shall particularly highlight past and present efforts to achieve aid effectiveness through partnerships between Swiss agencies and local partners. Discussion and learning from these experiences shall further enhance our motivation to reduce social exclusion and efforts to half poverty in Asia by 2015 (MDG N° 1).

Walter Meyer, Head East Asia Division

RESULTS OF THE LAO-SWISS PARTNERSHIP

The Lao-Swiss Partnership on rice addresses a key policy issue of the Lao PDR reform process called “New Economic Mechanism”, which started in 1960. The objective of the “Lao-IRRI Rice Research and Training Project” was twofold: Attain self-sufficiency in rice production and establish a functional rice research system.

After sixteen years of collaboration, the main partners, the National Agriculture and Forestry Research Institute (NAFRI) with its extension programme (National Agriculture and Forestry Extension Services), the International Rice Research Institute (IRRI) and the Swiss Agency for Development and Cooperation (SDC) have largely achieved self-sufficiency in rice production in Lao PDR. The production has increased from 1.5 million tons to 2.5 million tons/year, an increase of almost 70% over the last 15 years. With a total investment of some 16 million US \$ by SDC over 15 years, it was thus possible to increase rice production by one million tons (paddy) or 650'000 tons of rice per year. If this rice were sold on the world market, it would be worth some 200 million US \$ per year.

The achievement of self-sufficiency in rice production should be appreciated in terms of the paramount importance of rice for the Lao economy: Some 95% of rural households depend on agriculture as the main source of livelihood and 80% of the cropped area is planted with rice. It should also be kept in mind that the Lao population has increased from 4.25 million in 1990 to 6.4 million in 2006, an increase of 50%.

Rice is much more than a commodity in Lao PDR: it is the “fabric of life” and each person eats in a year more than 180 kg of this staple food. With an average family size of 6.7 members, this means that each family consumes over one ton of milled rice annually. To produce sufficient rice is a sign and symbol of wealth for a farmer family.



Those farmers who adopted modern varieties were able to increase their family cash income by 160 US \$ per year or half a dollar a day.

The increased production was achieved mainly through significantly higher yields per hectare, the introduction of better varieties and cropping practices, and the increase in production areas. In the irrigated rice areas, accounting for only 10% of the total rice cultivated surface, the yield increased from 3.42 tons in 1990 to 4.45 tons per hectare in 2004.

The Lao-Swiss cooperation has also put a lot of emphasis on capacity building and training in research. The National Rice Research Programme (NRRP) has been empowered by the International Rice Research Institute (IRRI) to develop its own adapted technologies and varieties. The Lao rice research capacity has been strengthened with some technical assistance by enhancing the skills of scientists in Lao PDR and providing adequate buildings and equipment.

In addition, SDC has supported a bio-diversity programme in order to preserve the genetic diversity of rice in Lao PDR. Over 8'000 traditional Lao rice varieties are preserved, and these varieties are an important genetic stock for developing modern high-yielding varieties and adapting them to new ecological situations world wide.

The success story of rice production in Lao PDR is still mainly concentrated in the rain-fed lowlands of Lao PDR, while the ecosystems in the uplands remain less productive for growing rice. To develop increased production and livelihood opportunities in the uplands as well, SDC is supporting efforts to find suitable alternatives from the slash and burn methods. To address this challenge, the Lao government is focussing on crop diversification and agro-processing in addition to staple food production.

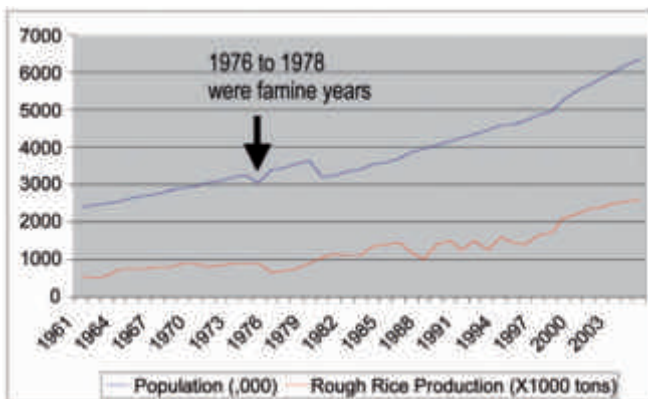
ONE MILLION TONS MORE RICE TO FEED TWO MILLION MORE PEOPLE

ONE MILLION TONS MORE OF RICE PADDY TO FEED TWO MILLION MORE PEOPLE

The population of Lao PDR is increasing at the rate of 2,5% per annum: from 4.25 million in 1990 to 6.4 million in 2006. Lao PDR had to feed almost 2.15 million additional people or 50% more in the last 16 years. In the same period, Lao PDR has been able to increase rice production by 70% or one million tons per annum (from 1.5 to 2.5 million tons), a figure which is hard to imagine. The production in 1990 was 350 kilograms of rice (paddy) per inhabitant and has now increased to about 400 kilograms for a significantly higher population.

RICE ACCOUNTS FOR ONE FOURTH OF GDP

For the economy of Lao PDR, rice is the backbone of the economy. It is estimated that one fourth of the GDP (gross domestic product) consists of rice production. The economy is thus focused on the basic needs of the population.



Surpassing population growth: rice production in Lao PDR

ANOTHER MILLION TONS NEEDED BY 2020

Although food availability at the national level is sufficient, poor farmers in remote and upland areas, often including ethnic minorities, are still struggling to meet their rice requirements fully.

Very segmented food markets contribute to this situation. Moreover, as the population is expected to increase to 8.8 million by the year 2020, the demand for rice will grow by about one more million tons of rice (paddy). The Lao-Swiss Partnership will address these challenges and with the strong institutional support now in place, is confident that all people in Lao PDR will be able to meet their rice requirements by 2020.



Rice market outside of Lao capital city Vientiane.



THE FARMERS AS THE MAIN ACTORS: TAKING RISKS FOR INCREASED BENEFITS



THOUSANDS OF SMALL FARMERS INVOLVED

Some 400'000 small farms were involved in producing one million more tons of rice. To achieve this, the farms have adopted innovative changes and have access to modern rice varieties and new farming practices. These changes imply risks for the farmers and have not always been easy to achieve. It is remarkable that in the lowlands of Lao PDR, more than 80% of the farmers have adopted new varieties and practices. In the central region of Lao PDR, the adoption rate is even higher, an estimated 98%. On national average (including lowlands, highlands, irrigation, shifting cultivation), the farmers have increased their yields from 900 kilograms per hectare in the 1960s to over 3 tons per hectare today.

HALF A DOLLAR MORE PER DAY FOR FARMERS

One can not become rich as a rice farmer, as rice is a basic staple crop, more important for subsistence than a cash crop. Only with very large surfaces would it be possible to create significant wealth for a family.

Nevertheless, it pays to switch over to the new varieties: The additional average net cash income from rice compared to non-adopters was 160 dollars in 2004 and has thus added half a dollar a day to the family income (according to the Lao National Human Development Report 2006, 26.3% of population lived in 1997/8 on less than 1 US \$ per day, a globally acknowledged poverty indicator). Since 80% of farm households have adopted new varieties, the Lao-Swiss Partnership has contributed to a substantial poverty reduction among rice growers on a national scale.

As most farmers also consume lots of rice for their families, this increase leads not only to significantly higher farm incomes but also to better food security and improved living standards. Since rice accounts for almost 70% of calorie intake per person in Lao PDR, increased production has the most direct effect on undernourishment and hunger. Almost three fourths of the households adopting modern varieties had surplus rice or were self-sufficient with rice. Of those farmers growing traditional varieties, only 36% had a rice surplus.

ONE MILLION TONS OF RICE – COMPARABLE TO SWISS WARTIME FARMING – THE WAHLEN PLAN

Not many people can imagine how much a million tons of rice is and what it means to produce it.

Switzerland had in 1939 the same population, 4.3 million, as Lao PDR in 1990 and food grain imports decreased by one million tons during the war. To counter this threat to its food security, Switzerland implemented the famous "Wahlen Plan", a massive initiative to mobilise domestic production: public parks were ploughed to grow wheat, football fields to grow potatoes. What was the result? Switzerland produced some 1.82 million tons more of potatoes with a calorific value equalling roughly 660'000 tons of cereals. The one million tons of paddy in Lao PDR equals some 650'000 tons of milled rice, too.

The increase in cereal production of hardly 100'000 tons was rather disappointing to F.T. Wahlen, the author of this plan, who later became Minister of Economic Affairs. However, if one counts all cereals, including the fodder for all the draft horses, one arrives at an increase of 270'000 tons of cereals produced annually.

All in all, the increase in rice production in Lao PDR is thus in the same order as the famous "Anbauschlacht", the Swiss war-time farming approach, an effort which truly mobilised most of the Swiss agricultural resources and innovative skills. The Swiss did not go hungry during the war, because they shifted mainly to potatoes as a staple food.

See: F.T. Wahlen: "Das Schweizerische Anbauwerk 1940 – 1945", Zürich 1946



The Bellevue in Zurich is ploughed for wartime farming. All efforts of the 'Wahlen Plan' resulted in roughly an equivalent of the 1 million tons of rice – but the Swiss had to switch to potatoes; the increase in cereal production was much lower.

FOCUS ON RAINFED FARMING: THE MAIN FACTOR FOR NATIONAL YIELD IN-

SEVERAL FACTORS WERE CONTRIBUTING

It is always difficult to attribute an increased production of a crop to one specific factor. Indeed, it is a combination of several factors that has made these changes possible:

1. **Committed Partners:** Since the Lao-Swiss Partnership addresses a key policy issue in the reform process of Lao PDR, commitment and ownership of national partners was the basis which could be further strengthened. In collaboration with IRRI as specialised partner in rice and SDC as committed long-term development partner, the local research and extension institutions were able to acquire the necessary capacity to enhance rice production and became centres of excellence in their field.
2. **Improved varieties:** 10 Lao modern varieties were developed through the Lao-IRRI Project, and 10 other modern varieties were developed in other countries and have been released so far. In addition, 12 traditional varieties including four black rice varieties were found suitable for areas beyond which they were traditionally cultivated and have also been officially released in selected provinces.
3. **Improved crop management practices:** a combination of improved practices such as the use of 25-day old seedlings, higher and balanced applications of fertiliser, weed management and intercropping with leguminous crops have been made available to the farmers in uplands.
4. **Dissemination and extension strategies:** While in 1990 only 5% of the land was cultivated using modern rice varieties, this rate has now increased to almost 70%. Adoption of modern varieties exceeds 90% in some areas in the lowlands
5. **Yields and food security:** The flat and water-rich lowlands are more suitable for modern rice cultivation than the uplands where rain fed crops are still predominant. In the central region, the yield increased by more than 1 ton per hectare, and in the southern region it still reaches 700 kilograms more per hectare.
6. **High return on investment:** The net present value of investment in the support is estimated at US \$ 60 million over 15 years (out of which 16 million US \$ from SDC). The increased productivity is estimated at a value of about 200 million US \$ per year. The Lao economy is reaping a high benefit from this investment.

“It is impossible to overstate the significance of the Lao-IRRI Rice Research and Training Project to rice production in the Lao People’s Democratic Republic (Lao PDR). Fifteen years have passed since the International Rice Research Institute (IRRI), with generous support from the Swiss Agency for Development and Cooperation

(SDC), began laying the foundations for a genuinely outstanding collaboration. Since then, we have seen the country’s rice production taking impressive steps forward. This has driven substantial improvements in food security and consequent reductions in poverty. And, just as important, Lao PDR now has a critical mass of well-trained research and extension personnel who staff a fully functional, independent rice research system.

I have supported the project from its outset and it is truly gratifying to have witnessed the progress made through the hard work of all concerned scientists from IRRI and other institutes, Lao research and extension staff, government and non-government organisations, donors such as SDC, and, last but not least, the rice farmers of Lao PDR. It is the farmers and their families and, in turn, all of the Lao people who are the true beneficiaries and champions of increased rice production and rice self-sufficiency in Lao PDR.”

Dr. Siene Saphangthong former Lao Minister for Agriculture and Forestry

IRRIGATED RICE

Today, about 10% of the rice area in the Lao PDR is irrigated, contributing to about 13.5% of the national production. Even though irrigated rice isn’t the main contributor to the national rice production, its importance is growing at impressive growth rates: from 12’000 hectares in 1990, the irrigated area has increased to 77’000 hectares or by 540%, while the yields have grown by 30% (from 3.42 tones/ha in 1990 to 4.45 tons/ha in 2004). Total production from irrigated rice has thus increased from 41’000 tons to 341’000 tons, an increase of over 830%.

IMPROVED RAINFED FARMING

Some 75% of the rice areas are rain fed, and are concentrated in the lowlands of Lao PDR. The bulk of the increase, nearly 900’000 tons, has been achieved in rain fed lowland farms where the area has grown by 47% (from 392’000 hectares to 575’000 hectares) and the yields have increased by 25% (from 2.76 tons to 3.43 tons per hectare).

About 8.5% of the rice areas are upland rain-fed production and 6.5% is worked under shifting cultivation practice. The yield in those two cultivation practices is significantly lower.

THE FUTURE CHALLENGE: FARMING IN THE UPLANDS

SHIFTING CULTIVATION AND UPLAND FARMING

Rice production in the uplands including shifting cultivation is more difficult and challenging: there are few land surfaces suitable for growing rice and total upland production is only 8% of the total rice production. The area of upland rice cultivation has decreased from 41% in 1990 to only 15% in 2004. This is mainly due to the discouragement of rice growing as part of the practice of shifting cultivation. This method implied often unsustainable slash and burn practices.

While shifting cultivation was an appropriate farming practice in the past, it is often not sustainable today with a higher population density. It is important to improve upland farming practices and introduce alternative crops and employment opportunities in the uplands. Switzerland is also engaged in such diversification activities, for instance in introducing viable agro-processing activities. Diversification is possible into products with a high value added, for instance growing bushes of which the bark can be used for paper making. Another important product is cattle raising, as the market for beef is growing very fast in Lao PDR and even more in neighbouring Vietnam, China and Thailand.

cultivation and only terraced plots of land should be used for growing rice. However, the upland population also depends on rice, and if a family can not grow its own rice for their subsistence, they have to purchase it.



On 10th November 2006, the Deputy Minister of Agriculture and Forestry, Mr. Ty Phommasack, awarded the Lao Friendship Medal to Dr. Walter Fust, Director General SDC, for the outstanding Swiss contribution to agricultural development in Lao PDR.



A mother living near Luang Prabang speaks her mind on traditional agricultural methods: “We used to practice shifting cultivation, but today it is not anymore profitable for us. Now, I buy rice for my family at the market”. Shifting cultivation has very low yield and severe environmental impacts. It is therefore not encouraged. Rural development projects are proposing alternative sources of income for the persons practicing shifting cultivation.

OPTIMIZING YIELDS WHILE PRESERVING BIODIVERSITY FOR FUTURE GENERATIONS

Each grain of rice contains a genetic code, which is the result of its cultivation over the last centuries. The foundation of a good breeding strategy is not only to maximise yields with a few high-yielding varieties but also to preserve a rich genetic stock of traditional varieties. These traditional varieties may have lower yields, but this is offset by other important characteristics: some may have resistance against specific pests, some are especially drought, flood or salinity tolerant, and some have different tastes. Lao PDR in particular has a rich tradition of special rice varieties such as “sticky rice”, black rice, and glutinous rice.

For this reason, SDC has supported biodiversity preservation allowing Lao PDR to establish a germ plasma bank, “the Lao people’s bank on biodiversity”. Over 15,000 samples with 3000 names, representing an estimated 8’000 rice varieties, are preserved in the collection. These varieties are an important genetic heritage which can be used in future breeding programmes.

It is estimated that over 140’000 rice varieties exist worldwide; A large collection is carefully preserved at the head office of IRRI (International Rice Research Institute) in the Philippines in order to meet future challenges in breeding. Lao PDR is the second largest contributor to the International Rice Genebank. The Lao-Swiss partnership has thus made here a substantive contribution useful worldwide.

Rice is already the main staple crop for over 3 billion people, half the earth’s population. It is estimated that rice production will need to feed over 4.6 billion people by the year 2025. This is a challenge which can only be met by releasing further varieties appropriate for every specific environment, and by developing efficient and effective local research, training and extension capacities.



Samples of rice varieties are collected in the field and stored in a germ plasma bank. Left: Dr. Appa Rao, the advisor for biodiversity, with a scientist from Lao PDR. Right: some samples of the wealth of nature.

STICKY RICE IN ALL COLOURS – BIODIVERSITY FOR DIFFERENT TASTES



GLUTINOUS RICE – A LAO SPECIALTY

Glutinous rice – some varieties with a dark colour (black rice) – is grown extensively in Lao PDR, and it used to be grown in neighbouring countries as well. Researchers believe that local people began cultivating glutinous rice 6'000 years ago.

The consistency of “sticky” rice is determined by two kinds of starch in the kernels, amylose and amylopectin. The more amylopectin, the stickier the texture. Glutinous rice is easily distinguished from other varieties by its milky colour. Most widely consumed where it is grown - mainly in dry areas of northern Thailand, Lao PDR and Cambodia - it is often used as an ingredient in sweet dishes and snacks, and for brewing beer.

Per capita, Lao PDR is the largest producer and consumer of glutinous rice, which accounts for about 85% of its rice production. Compared to many other rice specialities, the “sticky” varieties bear much lower yields, but their lower yield is compensated by higher prices and an increasing demand from international markets.

It is thus very important to preserve as many local varieties as possible, and focus on varieties with market potential. These traditional varieties could become high value export products of tomorrow. Rice eater will surely appreciate having the choice between white, black, red and also sticky!



Rice is the „fabric of life“ in Lao PDR: each family eats more than one ton per year of this important staple crop.

DEVELOPING RESEARCH CAPACITY TO ADDRESS NATIONAL PRIORITIES

From the outset, the objective of the Lao-Swiss cooperation was to set up a functioning national rice research system. Lao PDR was to be empowered to undertake its own research independently and to adapt scientific methods to meet the national needs and priorities. Switzerland has thus supported the National Agricultural Research Centre (NARC) to establish its own national rice research system.

INFRASTRUCTURE AND RESEARCH

During the first two phases of the Swiss supported Lao-IRRI Project (1990 – 1995), the emphasis was on establishing research farms in the field and on constructing the physical infrastructure such as buildings, laboratories and screening facilities. A network of regional research stations across the country under the umbrella of the National Rice Research Project has been established for developing and validating locally adapted agricultural technologies. The principal research centre is the National Agricultural Research Centre in Vientiane. 80% of the research is, however, conducted under on-farm conditions.

HUMAN RESOURCES DEVELOPMENT

After the Vietnam War which had a big impact on Laos, many Lao scientists left the country. The purpose of the human resources development programme was to quickly build up a critical mass of staff with all the skills needed to set up a functional research system. Lao staff participated in more than 4'600 training events including degree and non-degree training in reputed universities in and outside the region.

As the Lao-Swiss Partnership matured, the national staff took on an increasing role in research, planning and management. Training for senior and middle managers has enabled them to take on leadership roles in the overall management of research systems and programmes. Almost every agricultural organisation in the country has staff trained with Swiss support and over 75% of these organisations are headed by a trained senior staff. More than 150 scientific papers on rice and related sciences have been presented at professional meetings and many have been published.

ENVIRONMENTAL AND SOCIAL CHALLENGES

To achieve self-sufficiency in rice was an important national priority. The strategy of developing high-yielding varieties and more productive farming practices has proven to be successful. Productivity has dramatically increased in the lowlands, but the economic benefits have not been equally distributed among the entire country: the lowlanders, the



Training and capacity building was the major focus of the LAO-IRRI rice research programme

so-called Lao-Leum ethnic groups, have reaped more benefits than the other three main ethnic groups living primarily in the uplands.

Thus, it is a challenge to develop further suitable farming systems for the uplands where rice cultivation cannot be modernised in the same way. The increased productivity of suitable rice varieties for the uplands is the next challenge in order to grow more rice on smaller plots of land for home consumption.

Diversification into unique rice varieties and better cultivating methods in the uplands are one important task for the Lao-Swiss Partnership.

The research and extension system is working to find suitable answers to the country's future challenges.

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Further reading: www.nafri.org.la, www.sdc.org.vn

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