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HERBS, MUSHROOMS, AND FOREST FRUIT (MEDICINAL AND AROMATIC PLANTS): VALUE CHAIN ASSESSMENT

USAID AGRIBUSINESS PROJECT

JUNE 2008

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EXECUTIVE SUMMARY

Serbia has a centuries-old tradition of collecting medicinal and aromatic plants (MAPs), including wild herbs, forest fruits, and wild gourmet mushrooms. Out of about 700 species of herbs found in the country and among 420 that are registered as medicinal and aromatic, a total of 250 are put in trade as MAPs. Responding to ecological concerns, a quota system for the sustainable harvesting of wild plants was introduced into Serbia in the mid 1990s, which has worked well—some say too well—to protect 97 species of wild herbs and forest fruits and 15 species of wild mushrooms. Despite the diversity of products, only about 30 wild herbs, forest fruits, and mushrooms account for over 90 percent of the volume and value of wild harvests, while roughly 12 aromatic herbs are cultivated and account for 99 percent of the output of commercial herb farms.

As one might expect, cultivated mushrooms (button, 95 percent; shiitake, 5 percent; and other mushrooms, 1 percent) and herbs have recently shown the largest agribusiness growth, since the crops are not subject to any quotas, are easy to expand, and are much in demand. Medicinal and aromatic plants loom large in the Serbia's agricultural economy, since 1) these are high-value products, 2) the products, both wild and cultivated, are labor-intensive, and 3) these products rank high in Serbia's list of agricultural exports.

In the years when Serbia suffered from economic sanctions and a depressed economy, this was one of the only fields that offered people work, albeit seasonal work. However, in the last three to five years it has been increasingly hard to find people willing to collect wild products. One reason is that collectors have been able to find other jobs; another is that the prices paid to them have dropped as a result of the growing negotiating (or marketing) power of the packaging plants, which are the only holders of the Government of Serbia's export licenses and which have lowered their purchase prices to make their margins more profitable. Consequently, some collectors are now interested only in the very high-priced wild mushrooms, while many find the wild forest fruits are not so profitable as in earlier years. It is now mostly pensioners and their grandchildren who do most of the collecting, inasmuch as most young adults have moved away from the remote villages in the countryside where most MAPS are collected to find better work in the larger cities. The latest estimates are that about 50,000 people are working in the field during the late-spring and early-summer harvest months, down from about 150,000 people in the late 1990s. Unfortunately, there are few data sources that separate the wild from the cultivated MAPs. The total value of the industry in the domestic marketplace is conservatively estimated at \$150 million, with exports valued at \$50 million. (Note: all dollar figures are in U.S. dollars.)

The cultivated herb and mushroom subsector has real potential to grow in terms of the quantity and structure of production, economic growth, income generation, export gains, and job creation, all of which offer opportunities for the U.S. Agency for International Development (USAID) Agribusiness Project assistance. However, the main assistance that the USAID Agribusiness Project may extend is in supporting value-added processing, packaging, and branding of collected forest fruit, wild herbs, and mushrooms. Currently, this is seen as a way to raise the sales value of final products via branded retail packaging, rather than selling in bulk to EU packaging or processing companies.

In particular, the project may assist the subsector in improving marketing and obtaining organic certification, which may decrease imports and increase exports of products traded with neighboring

countries. With the project's help, increased sales may lead to better vertical and horizontal cooperation among the value chain stakeholders, increasing volumes of grown raw materials. This is a developing market that has many actors with which the project may work to boost production and thus increase export sales value. We hope that this assessment report will prove to be an effective tool for decision makers dealing with the subsector and that it will help the subsector capitalize on its prospective opportunities in the very near future.

TARGETS, OR POINTS OF LEVERAGE

The highest growth potential appears to be in the cultivated herbs, so this is a priority area for establishing sales and market linkages.

PROJECT STRATEGY AND APPROACH

The project should work with the producers to form an association, although it has been hard to get them work together in the past. Working with the individual processors and associations, the project's strategy would be to ramp up production of cultivated herbs and mushrooms and to improve the value-added sales of collected wild medicinal and aromatic plants.

Some wild MAPs have dramatically higher quotas than others. The project may therefore be able to form a mushroom, herb, and forest fruit producers association to promote sales of quality high-value branded MAPs, perhaps in retail packs, for both export and the domestic market, building on improved links with the larger supermarket chains.

INTRODUCTION TO THE SUBSECTOR

REASONS FOR SELECTING THE SUBSECTOR

Its contribution to employment and exports, as well as its potential for growth, are identified as the main reasons for working in this subsector, as discussed in this section.

EMPLOYMENT

This subsector provides seasonal employment and incomes to approximately 50,000 persons, including harvesters/collectors (mostly unemployed rural poor) and the owners and employees of businesses involved in trading, processing, and wholesale/retail sales of the subsector's products. Depending on the season and species collected, average employment for harvesters/collectors lasts about three months, during which a single experienced collector may earn \$2,000 or even \$3,000 total.

EXPORTS

This subsector is a **net exporter**, contributing positively to Serbia's foreign trade balance and showing a potential to further increase exports. Average 2004–2005 exports for this subsector amounted to \$22.1 million, while in the same period imports were less than \$3.6 million; thus the foreign-trade surplus achieved reached \$18.5 million.

However, there is increasing competition from Egypt, Bulgaria, and Albania. These countries are making inroads into the international market for chamomile and sage, and their herbs are entering Serbia even though the domestic market is protected by a 30 percent ad valorem (percent of value) import tariff. Serbia also imports MAPs that cannot be grown in Serbia, as well as some final products.

GROWTH POTENTIAL

The growth potential for this subsector is considered to be steady, without the up-and-down changes noted for many farm commodity groups. The growth of the world market for MAPs is estimated at 8–10 percent annually, according to the International Council for Medicinal and Aromatic Plants. The Food and Agriculture Organization (FAO) estimates 10 percent annual growth for wild fungi, but this may not be sustainable. However, the growth prospects within Serbia are also high, with per capita consumption increasing at about 3 to 5 percent annually over the last three years as a consequence of Serbian consumers' growing interest in eating "healthy" food and the constant rise of purchasing power.

Concerning cultivated herbs in Serbia, there are only a few sources of statistics, but they do show an expanding area planted to herbs. This was reported to have grown from 837 hectares in 1995 to 1,648 hectares in 1998 (both of these figures are from the same official source, which stopped reporting after 1998). In 2001, the area planted to herbs was over 3,000 hectares, according to the report "The Present State and Prospects of MAPs Production in Serbia," by R. Pavlovic, R. Jevdjovic, and Milena Djuric. Although this industry is not well reported upon by the Serbian government's crop reporting services, trade sources estimate that annual plantings have further expanded to cover about 5,000 hectares, with

most of the growth in Vojvodina. This growth rate is expected to continue, perhaps more rapidly as more profitable forward contracting is being arranged between processors, exporters, new farmer associations, and cooperatives.

Many in the industry believe that the largest growth potential lies in boosting sales coming from the Indjija Municipality of Vojvodina, where a cooperative acquired a primary processing machine in late 2006 with donor funding. This cultivated-herb coop has greatly expanded planting and has had its processing plant operating in 24-hour shifts for three to six months after the harvest season (June–October), since they produce, process, and bag nine different herbs. Another \$30,000 machine is planned for an investment in the Sombor area of Vojvodina by another group, should they secure financing. These farm groups are directly tied into the local market and also export largely via the German Martin Bauer firm, one of the world’s leading firms in the business, which buys everything they produce and asks for more for refining essential oils. Martin Bauer representatives say that the firm could easily take 10 to 20 times Serbia’s current production—and that Serbia could easily replace Albania as the region’s leading exporter of sage. (According to U.S. Department of Agriculture reports, Albania is the leading exporter of purple sage to the United States.)

ROOM FOR IMPROVEMENT: BETTER MARKETABLE YIELDS AND HIGHER VALUE SALES

In general, this subsector may be characterized as unorganized, since there are no established strong organizations of growers and processors that would coordinate activities in the field and lobby with the government. By organizing participants into producer groups, which would help their members with quality control, branding, denomination of origin, direct linkages with buyers, and organic certification, the industry should be able to raise prices by adding value to the products.

On the collectors’ side, this lack of organization is a result of fragmented collection, performed on a part-time basis by individuals or rural families. Further along the value chain, assembly and processing involves a large number of small and medium-sized companies exposed to strong competition and struggling to secure market share; therefore, they are usually hesitant to share data or to jointly plan activities with suppliers and counterparts. The main problem is a lack of information on the end product value on the part of both collectors and small traders (buying agents who link the collectors with the big processors). The prices traders pay for the herbs they buy from collectors are set based on the traders’ experience on this market and market demand. The prices that big companies will offer to traders are usually not known in advance. Artificially created market conditions of false low demand, combined with the poverty and powerlessness of most collectors, are exerting downward pressure on prices received by collectors. Therefore, collectors are receiving only a small portion of the product’s value. As a result, there is little vertical integration/coordination within the subsector. Obviously, agribusinesses in the subsector would benefit tremendously from collaboration, gaining economies of scale, branding, quality control, and better sales marketing. Since one of the objectives of the project should be to bring about that collaboration, the project may try to bring the industry together into working groups, despite their traditional reluctance to work together.

During the 1990s, Serbia lost the Western European market due to war and economic sanctions. Albania and Bulgaria took advantage of the situation and significantly increased their exports to the EU. Some of the younger players and new businesses in the subsector have initiated efforts to enter new export markets as well as to regain the markets lost in the 1990s (for example, the German market). Importers in Germany have mentioned that Serbian exporters should strengthen the supply chain to make it work more

efficiently, with more quality controls and more stocks on hand for delivery as needed (some importers still do not see Serbia as a “reliable supplier” compared with the competition). In addition, a large-scale shift toward more value-adding processing, retail packaging, branding, and introduction of end-user specialty products is seen as an obvious area to add value to the export market.

As mentioned earlier, there are limits to how many wild herbs, mushrooms, and forest fruits can be produced due to the risk of overharvesting (or going over the government’s quota levels). Processors state that the main way to boost value-added production in the short term is through value-adding processing and introduction of end-user products. To achieve this, major leverage points would be the producers’ organizations (POs), business associations, research institutes, nurseries, and export promotion agencies.

BOUNDARIES OF THE SUBSECTOR

This subsector covers all economic activities related to either growing or harvesting from nature, export-import trade, primary and final processing, and marketing of the three major groups of products, as follows:

MEDICINAL AND AROMATIC PLANTS (MAPS), CULTIVATED AND WILD-HARVESTED

Product types: fresh, (naturally or artificially) dried bulk, dried in retail packs, teas, and processed (MAP powder, essential oils, products for pharmaceutical, cosmetic, and nutritive purposes).

Among *wild-harvested* herbs the most common are juniper, St. John’s wort (also known as chantarion), yarrow, hawthorn, elder, primrose, linden, sweet basil, nettle, and balm.

Cultivated herbs are dominated by chamomile and mint, which comprise over 50 percent of total production, followed by sage, yarrow, thyme, oregano, and echinacea.

MUSHROOMS (CULTIVATED AND HARVESTED)

The most popular *cultivated* mushrooms are champignons (button mushrooms), with small quantities of oyster and shiitake mushrooms recently being produced. Food processors report that the most popular types of mushrooms are packed as either fresh or dried, cut, and pickled, placed in bulk containers (for export), and dried in retail packs (generally for local markets, but Serbians are starting to export these as well).

Unfortunately, there are few if any data on the size of this industry, such as the volumes and values by type of mushroom products. Worst still, many of the large and medium-sized processors see the other industry members as competitors and do not wish to work together, even though such collaboration would help their export marketing efforts, not to mention make it easier to meet their market information systems (MIS) needs. Since members of the industry currently do not work well together to make such surveys or promote their goods jointly as Serbian foods, this may be an area to explore as an activity. In any case, the project may need to conduct such surveys in the future to see if we can realistically assist the industry.

Among *wild* mushrooms, the most important economically are porcini (*Boletus*) and chanterelles or fox mushrooms (*Cantharellus cibarius*), followed by juniper mushrooms (*Morchella* or morels) and black trumpets (*Craterellus*). Due to the high prices they command on local and international markets, as well

as their nutritional/health characteristics, during recent years truffles have been becoming more interesting to collectors and processors.

FOREST FRUITS

Product types include fresh, dried in bulk, dried in retail packs, fruit teas, frozen in bulk, and processed (fruit juices, preserves, concentrates, brandies, etc.). The best-represented forest fruits in Serbia are berry fruits—including bilberries (also known as wild bilberries), strawberries, and blackberries— and rose hips.

Geographically, the collecting of wild herbs, mushrooms, and forest fruits is concentrated in the rural, hilly-to-mountainous areas of Serbia's eastern, southern, and western regions. Most MAP cultivation takes place in the Vojvodina region, while mushroom growing is spread throughout Serbia.

THE MARKETS

THE DOMESTIC MARKET

One of the most notable characteristics of the subsector is the fact that, except for cultivated mushrooms, the domestic market absorbs a relatively small portion of its products:

TABLE 1. HERBS, MUSHROOMS, FOREST FRUITS: DOMESTIC AND EXPORT MARKETS

Herbs (cultivated and collected)		Wild Mushrooms		Cultivated Mushrooms		Forest Fruits	
Export	Domestic consumption	Export	Domestic consumption	Export	Domestic consumption	Export	Domestic consumption
70– 80%	20–30%	95–98%	2–5%	2–5%	95–98%	50%	50%

Source: Josif Pancic Institute, processors, exporters, and other trade sources

CULTIVATED AND WILD HERBS, AND OTHER MAPS

The domestic market takes 20 to 30 percent of subsector production, with about 70 percent of the wild mushrooms and aromatic plants exported. Products sold in the country are herbal teas and tea mixtures, essential oils, and products for pharmaceutical and cosmetic industries. Serbia imports mostly either spices that cannot be grown or collected in-country, or raw materials from neighboring countries for further processing. The average recorded annual imports of MAPs for 2003–2005 were 455 tons. The main countries of origin of Serbia’s imports of MAPs and spices are Austria, the Russian Federation, EU countries, Montenegro, Macedonia, Egypt, Nigeria, and India. The majority of imported teas originate from the EU, China, Sri Lanka, India, Indonesia, and Vietnam.

MUSHROOMS

Due to high demand and attractive prices, cultivated mushrooms are almost exclusively sold on the domestic market, usually packed in plastic trays of 0.4 kg and wrapped in polyethylene film. A small fraction of the wild mushrooms that are processed and packed into retail packages is sold locally, mostly through supermarkets; the remaining 95–98 percent is exported, bringing in \$19 million annually. Serbia also records some imports of wild mushrooms, which in recent years have varied in value from \$203,000 to \$845,000. Most of these are imported by Serbian companies with branches in Russia and Romania; the mushrooms are intended for re-export after being processed in Serbia.

FOREST FRUITS

Due to lack of high-quality wild strawberry production, about half of those gathered are consumed via the domestic market via roadside sales and value-added products, such as jams and jellies. In the absence of good data, most people in the business estimate that almost half the wild strawberries are sold as fresh during the season and the other half processed into preserves and fruit juices. Similarly, about 30 to 40

percent of Serbia’s output of wild bilberries and rose hips are also consumed or further processed in-country.

Traditionally, the largest quantities of wild bilberries (*Vaccinium myrtillus*) are collected in Kosovo. Because of Kosovo’s unresolved status, it exports almost all of its wild bilberries to Serbia through Macedonia and Montenegro, either fresh (in 2006, 223 tons and 164 tons respectively) or frozen (290 tons total via Macedonia, Bosnia, Russia, and Montenegro).

THE EXPORT MARKET

The export market is the major outlet for most of the subsector’s products. However, much of the subsector’s income is earned from exporting raw materials and semi-final products rather than goods for retail sale:

- *MAPs*: approximately two-thirds are semi-processed—dried and graded—but are packed in bulk, not in retail containers. About one-third of the MAPs are processed into essential oils for further processing and the rest is intended for end-user consumption. Usually, the exported products are bulk containers of aromatic oils or of dried MAPs for processing in Germany, Hungary, Bosnia and Herzegovina, Macedonia, and Montenegro. Average annual exports of MAPs for 2003–2005 ranged from 1,078 to 1,307 tons. The herbs most heavily exported from Serbia are mint (327 tons) and chamomile (200 tons). For 2006, Serbian customs showed a jump to 5,200 tons of exports of dried mixes of herbs, with most of the increase going to Montenegro, Macedonia, and Bosnia.
- *Mushrooms*: Serbia’s output of wild mushrooms is almost entirely exported to EU countries (Italy, Germany, France), and to smaller extent, the United States. Over 95 percent of total production is sold fresh or semi-processed (dried or frozen), while the remaining 4.4 percent is sold as processed final product. Serbian exports continue to grow despite the inflation and appreciation of the Serbian dinar against the euro, so the subsector is either very competitive (which is the opinion of most industry sources), or just selling at a loss to maintain export markets.
- *Forest fruits*: As stated above, most forest fruits are exported (fresh, dried, and/or frozen). In 2006 Serbia exported a total of 24 tons of fresh fruit and 645 tons of frozen fruit. By far, bilberries are the largest export in this category, worth \$2.7 million annually. So far, all the quantities exported are wild, since cultivated *Vaccinium* varieties (blueberries) are only now starting to enter the market and not expected to yield significant results until 2009. Traditionally, European countries such as Austria, Poland, Germany, Holland, and France are the main destinations for forest fruits from Serbia.

TABLE 2: EXPORT PRICES FOR DRIED AND PROCESSED HERBS

Type/Average Export Price (in €)	Dried	Processed
Chamomile	1–1.3	3.5–4
Mint	0.5	2
Yarrow	0.9	1.7
Sage	0.7	2
Balm (also called sweet balm, lemon balm, melissa)	0.6	2
Thyme	0.7	2.2

SUBSECTOR MAP

VALUE CHAIN MAP

For the purposes of this assessment, the herbs, forest fruit, and mushrooms subsector has been divided into two constituent parts—the *wild-harvested* and the *cultivated*, the latter covering cultivated herbs and mushrooms only. The main criteria for making this distinction were the origin of commodities as well as similarities in production/collection techniques and overlapping of key stakeholders and marketing channels.

Figure 1: Subsector Map for Herbs, Forest Fruit and Mushrooms—Wild-Harvested

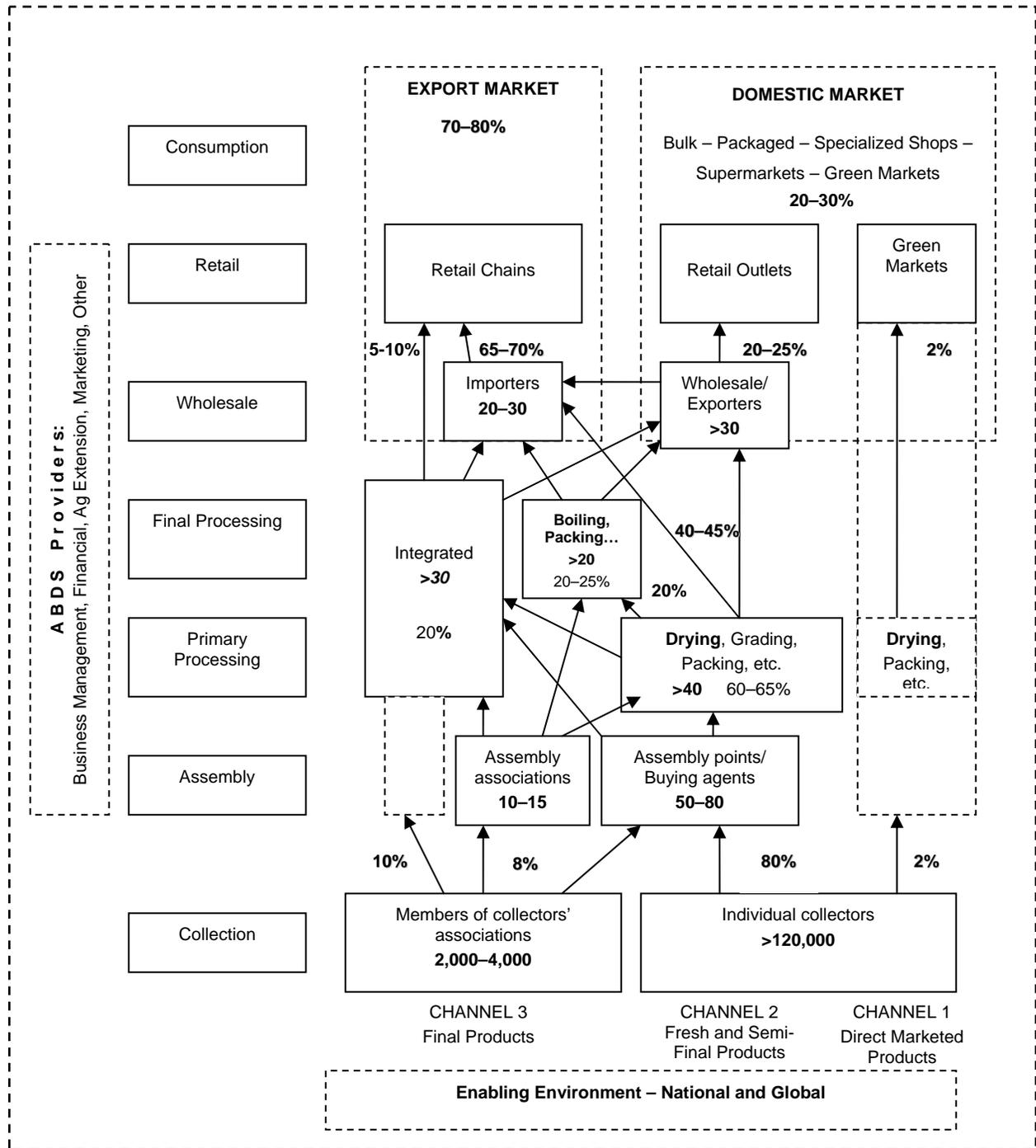
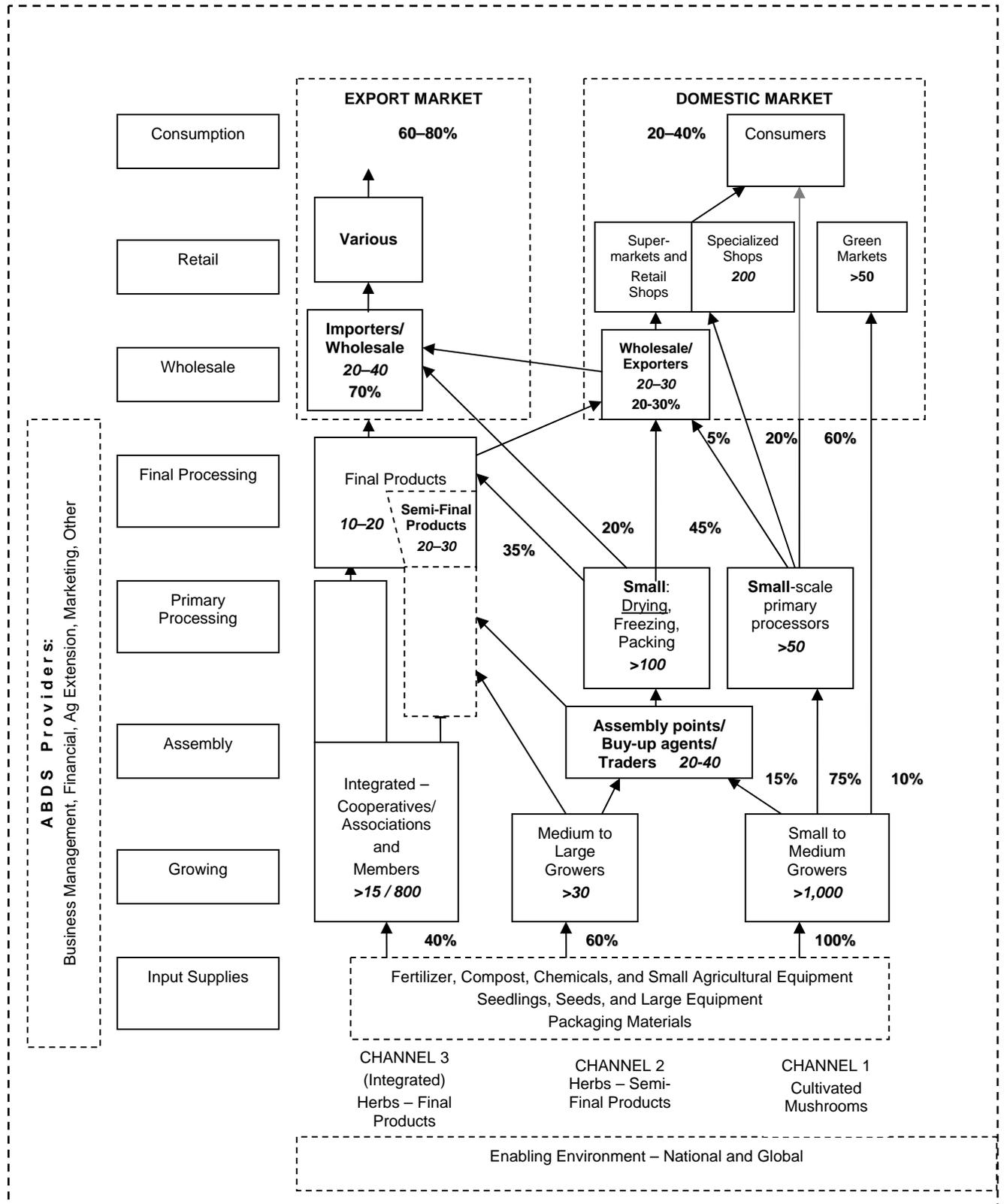


FIGURE 2: SUBSECTOR MAP FOR HERBS, FOREST FRUIT AND MUSHROOMS—CULTIVATED



DISCUSSION BY FUNCTION

PRODUCTION: OVERVIEW

About 30 species of herbs, mushrooms, and forest fruit are wild-harvested in Serbia in substantial quantities each year. In addition, 10 to 15 cultivated herbs and forest fruit are produced in growing amounts, according to interviews with Serbian government officials, processors, and other stakeholders. Unfortunately, very few solid data are available about the production of either wild-harvested or cultivated MAPs in Serbia. The very nature of the wild harvest means there are no available complete data series that would help researchers analyze the main characteristics of this industry and understand its trends. Available data show that only a small percentage of allowed quotas are collected legally. However, according to interviews with stakeholders and with staff of Serbia's Environmental Protection Agency, the actual quantities collected are much higher, because only herbs intended for export are reported. The situation is little better in the cultivated herb industry. This is an infant industry with few data on production, such as trade sources stating that about 200 hectares were planted to a combination of chamomile, sage, basil, parsley, and so on. Moreover, production is widely dispersed around the country.

Given these constraints, it is very difficult, time-consuming, and often costly to undertake the assessments of area planted and harvest data required for traditional crop reporting. In fact, even in most developed countries these niche markets are poorly reported upon, unless they are heavily subsidized by the local industry and governments. To overcome this lack of information, the three-member team that conducted this assessment combined data that were obtained from various sources, including available Serbian official statistics, the Serbian Chamber of Commerce, and international organizations (FAO and UN Comtrade), as well as through interviews with more than 20 stakeholders in the subsector.

The growth of the world market for herbs, forest fruit, and mushrooms has increased the demand for these products in Serbia. According to the survey conducted by the team, there is an unmet demand for \$700,000 worth of **processed herbs** per year (including fresh-packed kitchen herbs, spice blends for retail sale, mixtures of medicinal herbs, herbal dietary supplements, and extracts of essential oils) for national, regional, and EU markets. Also, there is unmet and growing demand worth \$20,000 per year on the domestic market and \$1 million per year on the EU market for **processed mushrooms and forest fruit** (end-user products). In addition, there is unmet demand worth \$2 million per year for fresh or primary-processed **wild MAPs**, and unmet demand worth another \$2 million per year for fresh or primary-processed **cultivated herbs**. The largest buyer, Martin Bauer, and similar companies report that they will purchase everything produced in Serbia and provide forward-contractual sales agreements to back up their expressed demand. The largest constraint on expanding the market is the limits on production of both wild and cultivated herbs, forest fruits, and mushrooms, given legal restrictions on wild harvesting and a lack of cultivated alternatives.

Obviously, there must be a ceiling on the collection of wild herbs and forest fruits, due to the risk of overharvesting them and thus depleting the forest of the wild plants, but the Serbian government has set quotas that are effective in limiting the risk and that it can easily monitor via the main export plants. In fact, the government's early quotas on production and exports, set during the 1990s, were very conservative; wild harvesting of herbs and forest fruit declined for a time, with the Serbian government imposing increasingly severe export/producer quotas. It took years for the industry to demonstrate that natural production was sustainable at a higher level. The Serbian government's Department for Environmental Protection (DEP) and the Ministry of Science and Environment have thus been revising

their quotas upward in recent years—often sharply—after undertaking some more careful studies. The safety of the new quotas has been verified by the universities, EU buyers, and international environmental groups.

For example, although the government authorities kept some forest fruit quotas at relatively low levels from 2000 to 2004, from 2005 to 2007 a number of sharp increases occurred. Juniper quotas grew from 201 to 2,000 tons annually, rose hips climbed from 297 to 5,000 tons, wild strawberries went from 21 to 150 tons, wild blackberry jumped from 45 to 2,000 tons, and wild bilberries rose from 681 to 2,000 tons annually.

Unlike wild herbs and fruits, wild wood mushrooms do not run the risk of overexploitation, since they are symbiotic with the larger trees and grow back naturally year after year if the trees are not cut down. This has not been a problem, according to both the industry and Serbia's DEP, which has eased quotas on mushrooms substantially for the past several years. For example, porcini mushroom quotas have risen steadily (by about 400 tons annually) from about 900 tons in 2001 to 4,000 tons in 2007, while quotas for chanterelles also rose steadily (by about 200 tons annually) during the same 2001–2007 period, going from 401 tons to 1,500 tons.

The DEP has been encouraging individuals to start growing many wild species for research (applied science) and may effectively license processors and exporters of wild mushrooms and wild herbs, since 95 percent goes to the export market and needs Serbian government papers. Two other steps—training the seasonal collectors and branding products as coming from regulated forest areas of Serbia, using importers' stamps (such as that of the German Natural Spices Association)—may expand sales, raise the value of the products, and make the industry a sustainable natural resource, with potential for higher value-added sales in retail rather than bulk packaging.

PRODUCTION: WILD-HARVESTED SUBSECTOR PRODUCTS

Wild Mushrooms

Porcini, Chanterelles, *Morchella*, and *Craterellus*. Annually, wild wood mushrooms account for about \$30–\$40 million in exports and are considered by the industry to be almost as profitable as raspberries, which are one of Serbia's best-known exports. Porcini (*Boletus edulis*) are the primary wild mushrooms collected in Serbia, representing 60–70 percent of total collection at an average selling price of \$8.76/kg fresh in 2006. Depending on seasonal fluctuations of yield, chanterelles account for around 20 percent of total collection, with an average selling (export) price of €8.83 free on board (FOB) for 1 kg of fresh product in 2006. *Morchella* and *craterellus* represent up to 10 percent of total wild mushrooms collected. The cost, insurance, and freight (CIF) prices are about €1 higher, but competitive with offers from other countries (such as Italy and France).

At the beginning of the season, chanterelles bring as much as \$19/kg, whereas the price goes as low as \$1–\$2/kg at the season's end. The average selling price per kg of fresh morels is \$50, vs. \$9 for *craterellus*. At the beginning of the purchasing season, the price per kg for fresh *craterellus* is nearly \$20, and at the end of season it is under \$10. Wild mushrooms are graded and separated by class based on size, color, and percent of broken pieces.

Truffles. The presence of truffles in Serbia, specifically *Tuber aestivum* (black summer truffles) and *T. magnatum* (white truffles), has been confirmed by several specialized local and international collectors. Areas where truffles have most frequently been found include the Fruska Gora mountain, the Macva and

Srem regions, and the Smederevska Palanka-Mladenovac-Topola triangle in Central Serbia. In 2006, 30 kg of truffles were collected and exported, bringing in \$45,495 of income (\$1,515/kg).

Although there are always many stories about smuggling truffles out of the country, most knowledgeable people in the business discount them as overstated, given that there are only a few areas where truffles occur naturally in Serbia. Since these areas are well known by the local villagers, the trade is relatively well controlled by them. More importantly, the Serbian export customs police, who have been increasingly checking for illegal drug shipments, often catch people trying to smuggle out undeclared high-value goods such as truffles and have even sent some truffle smugglers to jail—to live alongside the common criminals as a deterrent.

Forest Fruits

The best-represented forest fruits in Serbia are berries (bilberries, strawberries, and blackberries) and rose hips. Depending on the weather and the available quotas, the average production of forest fruits in Serbia has varied significantly, from 230 tons in 2001 to 1,040 tons in 2005.

The quantities of leading wild species collected in Serbia 2000–2005 are presented in Table 3 below. Given the expanded quotas for high-value mushrooms, the project has room to work with the processors/packers and the Government of Serbia to boost output without damaging the environment. We may be able to promote the fact that these products are organic and naturally raised in a sustainable, environmentally protected manner. Often, one can obtain some sort of international certification from international academic or well-recognized food safety organizations to brand such food items as eco-friendly, helping Serbian sellers to get higher prices.

TABLE 3: LEADING WILD SPECIES COLLECTED IN SERBIA 2000–2005, QUANTITIES IN KG

#	Description		2000	2001	2002	2003	2004	2005
	Latin	English						
1.	<i>Fragaria vesca</i>	Wild strawberries	11,625	5,206	4,550	2,740	14,530	20,690
2.	<i>Rosa canina</i>	Rose hips	–	56,626	32,988	46,250	568,504	296,984
3.	<i>Rubus ulmifolius</i>	Wild blackberries	4,456	2,245	8,090	25,956	4,200	44,940
4.	<i>Vaccinium myrtillus</i>	Wild bilberries	253,460	166,120	180,512	488,450	277,105	680,850
5.	<i>Juniperus communis</i>	Juniper	258,420	–	31,385	10,150	206,850	200,980
6.	<i>Boletus edulis</i>	Porcini	1,723,391	941,323	1,144,621	1,302,493	2,934,992	3,584,300
7.	<i>Cantharellus cibarius</i>	Chanterelles (fox mushrooms)	807,429	400,989	452,064	405,500	744,500	1,274,700
8.	<i>Craterellus cornucopioides</i>	Black trumpet mushrooms	65,000	84,000	11,000	29,240	12,500	92,000
9.	<i>Lactarius deliciosus</i>	Lactarius, milk-caps	20,000	15,200	–	24,000	61,000	29,000

Source: Institute for Environmental Protection, Belgrade

PRODUCTION: CULTIVATED SUBSECTOR PRODUCTS

Thirty-nine herbs and a few forest fruits are grown in Serbia. According to most sources, the total area of MAPs under cultivation in Serbia varies between 1,500 and 2,000 hectares. Most MAP cultivation takes place in Vojvodina, with a small amount of production established in eastern Serbia during recent years. The total number of MAP growers is estimated to be between 600 and 1,000.

In addition to production, typical functions conducted by growers are cleaning, threshing, grading, and simple air-drying—functions often performed by collectors as well.

Cultivated Herbs

As is the case for wild herbs, the demand for cultivated herbs (chamomile, sage, dill, parsley, and so on) is far from being met. The advantages of growing over collecting herbs include larger, higher-quality yields and the opportunity to grow plants, some quite profitable, that cannot be found in nature in Serbia. The biggest profits are offered by valerian, which yields a gross income of about \$12,000/ha (total cost per hectare is about \$2,400, and profit about \$9,600). Although marigolds, being labor-intensive, have the highest costs of production of any herbs, they are still very profitable, with gross sales revenues of about \$7,200/ha, production costs of about \$4,700/ha, and net profit of about \$2,500/ha. Given these incentives, experienced farmers are already organizing into production units and producing herbs for local primary processing and collection areas. Packaging and branding are still constraints, but promoting investments in additional processing facilities to cut, sort, size, grade, and package the products for retail/wholesale

distribution would provide more market outlets for farmers, who are quite competitive overall vis-à-vis another important source of these goods—Egyptian farmers—because of low water costs and nearness to the wealthier markets in Northern Europe. Although Serbian costs of production are about 20 to 40 percent above those of Egypt, lower transportation costs and high margins still make it a very attractive market for the foreseeable future—thus Serbia is quite competitive in cultivated herbs.

The constraints of lack of production, value-added packaging, and branding may be addressed by working to form associations of producers. Unfortunately, the manufacturers licensed by the DEP see each other as competitors and are not likely to work together. However, the main export outlet—the giant German herb corporation, Martin Bauer—may be able to work with many producers, both growers of cultivated products and some wild-harvesting groups.

The production of cultivated herbs in Serbia significantly declined during the 1990s, but has recently begun to revive with new investments and plantings on larger private farms. Since it is a profitable business, production of these herbs has taken off in Vojvodina and is expected to continue to grow rapidly, inasmuch as producers are re-investing their earnings into additional production for future years. However, Serbians are selling most cultivated herbs just dried, without any level of processing, thus missing a valuable opportunity to increase the value of these exports. Unfortunately, as noted earlier, there are little if any data on the quantity produced, and no real unified industry to support such a survey. However, rough estimates from those involved in the trade in Vojvodina state that about 10 tons of chamomile are produced annually, 5 tons of mint, and 1 to 2 tons each of sage, balm (melissa), and thyme. The quantities of all these herbs are expected to double and quadruple over the next two to three years, as producers are forward-contracting for additional production.

Cultivated Mushrooms

Similarly to other products of the subsector, there are no available official data regarding the volume and value of the production, trade, and consumption of cultivated mushrooms in Serbia. The most popular cultivated mushrooms are champignons (button mushrooms), along with very small quantities of oyster mushrooms and shiitake. The cultivation of mushrooms in Serbia is typically conducted as a small-scale family business, usually on premises that originally were not intended for this purpose, such as railway tunnels or abandoned farms. In fact, there are only 10 button mushrooms farms built for this purpose in Serbia, with an annual production of 1,750 tons. The experts our team interviewed in this field estimate total production of button mushrooms in Serbia to be between 6,000 and 8,000 tons per year, which, if multiplied by the average wholesale price of \$2/kg, makes the average value of this market approximately \$15 million. The production is spread equally throughout the country—there are nearly 1,000 small button mushrooms growers in all. Of these, however, only 20 may be considered mid- to large-scale growers with an annual capacity exceeding 100 tons each. The total number of persons employed in this industry, including part-time employees, is estimated at 15,000 individuals.

The volume of production of other cultivated mushrooms in Serbia is rather low: trade sources estimate it at 500 tons for shiitake mushrooms and 100 tons for oyster mushrooms, due to restrictive consumption patterns. For example, oyster mushrooms are suitable for fresh consumption only. Growing shiitake mushrooms requires significant investment in growing medium and know-how, and since so far this has not been shown to be profitable, investors have not found it worth their while to invest in commercial-scale shiitake mushroom agribusinesses in Serbia.

Input Supplies

Production inputs play a crucial role in the cultivation of MAPs. However, supply problems and high prices both act as constraints on their production in Serbia. To overcome shortages, large or medium-sized processors often purchase the inputs on their own and provide their suppliers with necessary inputs, such as seeds and crop protection.

Besides commonly used agricultural machinery, efficient harvesting of some MAPs requires special mechanical harvesters. Most models are suitable for large farms and are too expensive for an average grower in Serbia (this is a real barrier to entry). Other types of necessary equipment (storing, grading, drying, and packing) can be ordered from specialized importer/retail companies.

Cultivated Herbs. Quality seeds and/or seedlings for herb cultivation are not easy to obtain in Serbia. In particular, there are shortages of seeds/seedlings of species that are new cultivars. A significant part is being imported, while the remainder is produced by the Josif Pancic Institute and a few small, privately owned nurseries and/or traders. The quality of inputs provided by the latter is often questionable, but even more important is the occasional discontinuity of supplies. Unfortunately, importing inputs is somewhat difficult in Serbia because of its small market and high tariff protection of 30 percent ad valorem (plus huge mark-ups after import). Thus, high-priced inputs are the constraining factor for most Serbian agribusinesses.

Apart from organic fertilizer, some species need special mineral fertilizers and means of biological protection. As with seeds, farmers can procure them from Josif Pancic Institute and a few specialized wholesale/retail companies.

Mushrooms. In Serbia the mushroom input supply market is often short of suppliers, with temporary production shutdowns because of shortages of some key inputs. Serbia has no production of mycelium, the most important input for mushroom cultivation. According to the Serbian customs service, 7,360 tons of mycelium worth \$1.16 million was imported in 2006. Over 97 percent was imported from Hungary and distributed to button mushroom farms in Serbia.

Most of its needs for compost Serbia covers from its own production. Among the country's sources of compost, those whose products are most widely found in the market are producers located in Kovin and Vrsac.

Business Development Services

Specialized know-how and advice related to growing technology, protection, harvesting, and storing is of vital importance to successfully growing MAPs. The main sources of these are, again, experts from the Josif Pancic Institute. However, the Josif Pancic Institute is both a producer and a consulting company, which some view as a conflict of interest (that is, their role as an ABDS is in question). There are a few other business service providers, including the Novi Sad Field Crops and Vegetables Institute, the Backi Petrovac Fodder Crops and Medicinal Herbs Institute, and the agricultural faculties in Novi Sad and Belgrade. Unfortunately, too few private ABDS providers specialize in MAPs.

OTHER SUBSECTOR FUNCTIONS AND PARTICIPANTS

Collection

It is estimated that this subsector employs thousands of collecting families in Serbia (some estimates even go up to 120,000–150,000 individuals), the vast majority being low-income rural families. Collection is

seasonal work that happens only during the growing period, from April to November. In general, all household members are involved in collection and, very often, collection is combined with other activities, such as herding or cultivating land. Collection is highly dependent on weather conditions, so collectors' prices change daily in accordance with quantities collected/offered, being highest at the start of the season. Most collectors are organized by trading companies (in some cases by agricultural cooperatives as well) who sell directly to processors/exporters. Many of these entities also trade in other non-timber forest products. Besides collection, other functions usually conducted by the collectors are cleaning, threshing, separating, grading, and simple air-drying. Given the large number of people of different backgrounds and ages who collect on a seasonal basis, this group is the least organized and represents the weakest link along the value chain.

Growers' and Collectors' Organizations

As mentioned above, there are approximately 20 organizations in Serbia that bring together over 1,500 collectors, growers, and/or processors of herbs, mushrooms, and forest fruit at the regional and/or municipal level. In Vojvodina, these organizations are usually cooperatives, while in Central Serbia associations are the form that prevails. Most of these organizations are weak and currently are in the initial phase of functioning, trying to establish regular delivery of tangible services to its members. The strongest is the Dr. Jovan Tucakov National Association for MAPs, based in Sokobanja; this group comprises over 200 collectors and businesses involved in processing from Serbia, Montenegro, and Bosnia and Herzegovina. This association was supported through the EU-funded SEED program, as well as assisted by German organization GTZ in establishing a website.

Assembly/Traders

Acting as assembly points, traders are in most cases a necessary link within the value chain. As processors' buying agents in remote areas (or areas that are distant from a processing plant), they collect products from collectors and thus fill the gap between collectors and processors. Usually they provide some other services, such as grading, re-packing and transportation, while in some cases they do the drying of MAPs or mushrooms as well. The margin they charge is usually negotiated with processors, and on average it varies from 12 percent to as high as 30 percent.

They must fulfill common requirements for traders—become officially registered for such activities, possess appropriate storing rooms for various products, be equipped with scales for weighing goods—but otherwise there are no other requirements they must meet. Since this is a part-time activity, very often the assembly of goods in remote areas is conducted by owners of small village retail shops. Goods are also sold to the larger supermarkets by larger producers. Given that they deal with foodstuffs, of which a significant part is for export, too often working conditions in these businesses are far below what is required by regulations and/or good practices (especially in the mushroom industry), a situation that negatively affects products' quality, safety, and price. To secure future development, all stakeholders of the subsector need to jointly focus on improving working conditions by setting up a cold chain introducing/meeting more strict hygienic and sanitary/phytosanitary standards and implementing international standards for food safety, such as Hazard Analysis and Critical Control Point (HACCP) requirements.

Processing

Most of the subsector's products from Serbia are sold on the international market as fresh, without any value-adding processing; in case of wild mushrooms, it is nearly 72 percent (however, almost all the lower-priced cultivated button mushrooms go as fresh sales to the domestic market). Processing companies are mostly small to medium-sized family businesses employing 2–100 employees. Small-sized processors commonly do the *primary* processing, including grading, threshing, drying, cutting, and packing. As most of these operations are done manually and are extremely labor-intensive, during the processing season primary processors employ from a few dozen to as many as 100 or more employees on a part-time or seasonal basis. In this way the subsector is a large source of employment for unskilled workers, even for elderly women in less economically favorable areas in Serbia.

However, there are approximately 20–25 larger processors in Serbia that through boiling, oil extraction, pickling, etc., do the *final* processing that adds more value to a product. These processors turn out goods packed for end users, such as tea mixtures, powders, essential oils, forest fruit preserves, and pickled mushrooms. By growing their own raw material and/or via contract-based growing, these businesses in some cases integrate several links along a specific value chain.

The leading processors of herbs in Serbia are Macval (Novi Sad), Melissa (Coka), Fructus (Backa Palanka), Aleva (Horgos), and Herba (Belgrade). Among processors of mushrooms and forest fruit, the leading companies are Jurofungo (Kursumlija), Interfood (Cacak), Marni (Krusevac), Foodland (Belgrade), Igda (Belgrade), and BMD (Arilje), among others. Besides processing conventional products, some of processors listed produce certified organic products as well (Jurofungo, Marni, Foodland, BMD).

Wholesale/Exports

This group includes exporters as well as wholesale companies. Since most of the subsector's products are for export, there are many more companies specializing in exporting MAPs (20–25) than in selling them wholesale (5–10, half of which specialize in macrobiotic food). Most exports go through the companies mentioned above.

Retail

Domestic retail outlets for the subsector's products include supermarket chains, groceries, health food shops or macrobiotic food stores, and, in case of some products, green markets. Supermarket and health/macrobiotic food stores as channels for these products are growing fast, while green markets and small grocery shops are decreasing.

CHANNELS AND GOVERNANCE STRUCTURES: WILD-HARVESTED SUBSECTOR PRODUCTS

We have identified three channels for the harvested herbs, forest fruit, and mushroom value chains: directly marketed products, semi-finished products, and finished products.

CHANNEL 1: DIRECTLY MARKETED PRODUCTS

Besides collection, approximately 2 percent of all collectors of herbs, forest fruit, and mushrooms in Serbia do other operations necessary to sell products directly to consumers. These operations usually include cleaning, drying, cutting, and sometimes packing, mostly of herbs (chamomile, mint, sage, etc.) and forest fruit (bilberries, strawberries, and rose hips)—rarely wild mushrooms. Packaging materials

vary from modest paper bags to common glass jars and plastic punnets (small baskets for fruit). Local green markets are the main venues where collectors directly sell these products in bulk or packed, together with other agricultural products. Some collectors also sell smaller amounts of collected forest fruits on road stalls. This way, the collectors achieve prices that are 50 percent higher—sometimes even double—the wholesale price for their products. For instance, in 2006, wild bilberries were bought by assembly agents for 180–240 Serbian dinars (RSD)/kg, while collectors sold them on green markets at 250–350 RSD/kg. However, due to the growing market share occupied by supermarkets in Serbia, this channel will continue to shrink in future years.

CHANNEL 2: FRESH AND SEMI-FINISHED PRODUCTS

As mentioned before, most (80 percent) of the subsector's products are exported as fresh and/or semi-finished. Individual collectors and some collectors' organizations deliver collected products via assembly points/traders to primary processors. Currently there are nearly 40 small and medium-sized businesses that conduct primary processing of herbs, mushrooms, and forest fruit, including grading, drying, freezing, cutting, and/or packing. Only one-third of this channel's production goes to final processing in Serbia, while the majority is sold via wholesalers and retailers to consumers (domestic or foreign) and to foreign processors. Typical products of this channels are dried porcini in bulk (assembly point price for fresh = \$6/kg, dried = \$30, export price = \$40–\$60) and frozen wild bilberries in bulk (assembly point price = \$4.50/kg, while freezing adds a cost of \$0.30/kg; export price = \$6). This channel will continue to be the largest one within this value chain, but it will slowly decrease in size and value due to the expected expansion of final processing.

CHANNEL 3: FINAL PRODUCTS

Fewer than 30 medium-sized businesses in Serbia produce end-user products made of herbs, mushrooms and forest fruits. These products include essential oils, herbal tea mixtures, retail-packed spices, forest fruit preserves, pickled mushrooms, and more. They are sold to retailers and consumers in country and abroad, with exports being still the most lucrative market. Domestic and export sales are made either directly or through a network of wholesale or import companies. Approximately half of these final processors have partly or completely integrated assembly points, primary processing, and final processing. The market share of this channel is estimated at 20 percent, but it will continue to expand over time. One part of this channel has contract-based long-lasting cooperation with POs (some 15 cooperatives and/or associations, mostly located in Vojvodina), which enables them to better plan production and decrease costs. This channel shows very good prospects due to stronger connections among various links, processors' increased focus on producing value-added end-user products, and the growing interest of domestic consumers in these products.

CHANNELS AND GOVERNANCE STRUCTURES: CULTIVATED SUBSECTOR PRODUCTS

Among MAPs within the Serbian value chain, we have identified three products as promising: cultivated mushrooms, semi-final herb products, and final herb products. There seem to be few if any firms that are producers of both wild and cultivated herbs and mushrooms. The producers of cultivated herbs are in the northern Vojvodina province, where there is little in way of wild herbs. Although some truffles are collected on the Fruska Gora mountain in Vojvodina's Srem region, this involves individual collectors and small companies that have nothing to do with the cultivated herb production on the plains of

Vojvodina. Thus, there is little in way of horizontal integration between the wild and cultivated herb and mushroom producers. Nevertheless, some communication networks could be established to help them all market their food products as “Serbian foods.”

CHANNEL 1: CULTIVATED MUSHROOMS

As discussed previously, there are nearly 1,000 growers of cultivated mushrooms in Serbia, of which only 50 do primary processing, including grading, labeling, and packing in bulk packages and/or retail packs. This absorbs almost 75 percent of the volume produced in this channel and is mostly (95 percent) directed to domestic retail outlets, as well as to wholesalers/exporters (5 percent). Growers sell 10 percent of the cultivated mushroom output directly at green markets, packed or in bulk. Another 15 percent is sold via collecting agents to processors from other channels. Due to increased domestic and foreign demand, this channel will continue to grow in both the volume and the value of its production. However, due to strong competition and a process of concentration that has already started, the number of businesses involved will decrease drastically over the next few years.

CHANNEL 2: SEMI-FINISHED HERB PRODUCTS

Like harvested goods, most cultivated herbs are sold at domestic and foreign markets as semi-finished products. These include dried and/or frozen herbs and forest fruit in bulk. This channel has approximately 30 small and medium-to-large growers, 20 to 40 buying agents, and almost 100 small units for primary processing. The main destinations for products in this channel are final processors (35 percent) and wholesale export companies (65 percent). This channel will continue to be the largest within this value chain, but it will decrease in both size and value due to expected expansion of final processing.

CHANNEL 3: FINISHED HERB PRODUCTS

This channel absorbs almost 40 percent of the value chain production. It involves approximately 15 POs who usually, apart from growing, provide other services such as drying, grading, and packing (partly integrated functions). Operating under annual contracts, most of them supply final processors with semi-finished materials needed for their processing. Typical products of this channel are essential oils and special tea or spice mixtures. Their main destinations are wholesale/export companies that distribute these products further up to end-users in Serbia (20–40 percent of total production) or abroad (60–80 percent). Due to increased domestic and foreign demand, this channel will continue to grow in the volume and—more significantly—in the value of production. However, the growth rate will be lower than is generally expected because of existing barriers to entry, primarily the large investments and special know-how needed for successful operations.

LEVERAGE POINTS

We recommend that the project work with the following organizations as leverage points:

- Collectors’ and processors’ associations (for example, the Dr. Jovan Tucakov Association in Sokobanja): these organizations comprise more than 1,500 individual collectors, as well as almost 100 small businesses involved in this sector. Even though most of them are weak, they still have potential to strengthen and develop the scope of activities in a way that will provide tangible benefits for the most vulnerable rural population in Serbia.

- Research and information dissemination centers (Department for Environmental Protection, Josif Pancic Institute): these are the main source of expertise and the major future providers of research, training, and education services within the project. The project could help them to diversify the services they provide and to focus more on commercially viable activities.
- Private nurseries: as stated above, Serbia already lacks sufficient quality seeds and /or seedlings for this subsector. In cooperation with major processors, the project should assist these small businesses to diversify production and improve the quality of products/services.
- Other: faculties of agriculture in Belgrade, Novi Sad, and Cacak; agricultural extension services; and similar sources of expertise.

SUPPORTING ORGANIZATIONS AND REGULATORY FRAMEWORK

SUPPORTING ORGANIZATIONS

In general, privately owned ABDS providers specializing in this subsector are quite rare or absent in Serbia. Most services are either delivered by state-owned supporting institutions (such as the Josif Pancic Institute or the DEP) or by experts employed there. The main reason for such a situation is low demand and a lack of trust in private service providers of this type.

Serbia has a network of institutions that support this subsector; we have identified the following as most important:

- Josif Pancic Institute, Belgrade
- Department for Environmental Protection, Belgrade
- Field Crops and Vegetables Institute, Novi Sad
- Fodder Crops and Medicinal Herbs Institute, Backi Petrovac
- Agricultural faculties in Belgrade, Novi Sad, and Cacak
- Serbian Investment and Export Promotion Agency (SIEPA), Belgrade
- Agronet, Belgrade (an NGO specializing in agriculture and rural development)
- Timocki Klub, Negotin (an NGO specializing in local economic and rural development)
- Regional Environmental Center (REC), Pirot
- Agriculture Development Centers in Sabac, Arilje, Novi Knezevac, etc.
- Business incubators in Zrenjanin and Prokuplje
- Network of regional agencies for SME development
- Consulting and certification firms for international standards (including organic certification, HACCP, GlobalGAP, etc.)

REGULATORY FRAMEWORK

We consider the regulatory framework covering this field in Serbia since 1993 to be functional. The most important acts regulating this field are:

- The law on environmental protection (2004 version).
- The regulation controlling the utilization of and trade in wild flora and fauna (2005 version).

These regulations list protected and endangered species in Serbia, define monitoring mechanisms and institutions in charge, and prescribe recommended harvesting and utilization techniques.

Once a year the Ministry of Environment, together with the DEP, reviews existing quotas and, based on the current situation and recent trends, establishes new ones. Then it publishes quotas and issues a call for applications to collect wild species. Only businesses that are officially registered and sufficiently equipped for this kind of activity are eligible to apply. In addition, they have to specify the species that they will collect, as well as the areas where they will collect and the collection points through which collected quantities will be purchased. Therefore, usually only larger processors are qualified to get a license. Licenses are valid until the end of the calendar year and cannot be extended or traded.

Collection/harvesting techniques, quantities collected, and sanitary conditions are monitored by environmental inspection units and the DEP on an as-needed basis.

SUBSECTOR DYNAMICS

MARKET TRENDS AND DRIVERS

MARKET TRENDS, GROWTH RATES AND SUPPLY GAPS

- According to international experts, at this point the worldwide market for MAPs is increasing at an annual rate of 8–10 percent; the market for wild fungi, at 10 percent annually. These trends are expected to continue because of increased demand for ethnic food and for food supporting a healthy lifestyle, both of which are becoming more and more popular.
- As a result of generation change/aging rural population and temporary price drops, combined with increasing costs of living, the number of collectors in Serbia has been declining steadily in recent years.
- The share of organic food in the subsector, as a niche market, is constantly growing in Serbia and in globally. According to sector participants interviewed, it has just begun to be easier to sell certified organic products at higher prices in both export and domestic markets (the price premium has varied between 5 and 15 percent so far).

On the other hand, there is some difference of opinion within the industry if it is worthwhile to get their organic certification. Many of these products are already considered to be “organic” foods in the Serbian domestic market, although internationally accredited firms have not yet certified them as such. Frankly, even in the international markets, most consumers consider forest fruit and wild mushrooms to be intrinsically organic. Thus, there seems to be a consensus that prices will not much increase if these foods are labeled organic. Most firms in this subsector report that the organic certification firms cost too much and the foods are already treated as organic anyway, so why spend the money if you do not get it back through higher sales prices? Domestically, however, the label can state that the food is organic for the relatively minimal cost of printing it and checking with the Serbian organic certification authorities.

- Due to increased consumption in-country, in recent years there has been a slight decrease in the share of Serbia’s cultivated mushrooms, especially button mushrooms, on the global market. This has resulted in unmet demand and increased interest in other sources of supply, including other countries of Eastern Europe.

CHANGES IN THE STRUCTURE OF THE SUBSECTOR

- As described earlier, the market share of the “finished products” channels will continue to grow over time, mostly due to changes in consumers’ behavior (interest in consuming healthy/ethnic food) and the increasing market share of supermarket chains.
- POs are becoming more effective (though still not enough): they are starting to play an important role in collectors/growers’ education, in improving the quality and safety of products, and in further diversifying production.

There needs to be more central marketing and collection points, as well as consolidation of shipments to major markets. Currently, exporters are shipping mostly partial container loads of exports, which raises

unit costs. The major customer is Martin Bauer, and although this is a weakness in terms of a lack of diversified buyers, it also is a potential advantage in terms of combining shipments to the same customer. Unfortunately, most of Serbia's exporters in this sector are not used to working together, so this may be a hard approach to sell. But since it should be financially rewarding, that may be incentive enough.

CHANGES IN THE ENVIRONMENT

- National and international bodies are putting into force more restrictive regulations, including providing for products' traceability, with the aim of preserving ecosystems, securing biodiversity, and improving food safety. These should be mandatory topics for all training programs supported by the project—not only those for collectors, but also those for processors and environmental inspection staff in Serbia.

BOTTLENECKS

- Barriers to entry that prevent the subsector stakeholders from more broad shift to cultivated herbs are (a) the high investment needed for equipment and initial planting, and (b) the specific know-how needed for success in growing, harvesting, and storing new species under cultivation.
- Barriers to entry that prevent the subsector stakeholders from stronger shift to production of end-user products are (a) the high investment needed for processing equipment, (b) the specific know-how related to processing technologies required for success, and (c) insufficient knowledge of consumers' behavior and of distribution channels for these products.
- Some supporting institutions (for instance, the Josif Pancic Institute), intended as leading centers of research, processing, and advisory services in the subsector, are barely functional and provide too little support to producers and collectors.
- There is a lack of organization and communication among value chain actors.
- Serbia has very limited natural resources, and overharvesting is a risk.

VISION FOR GROWTH

Based on interviews with members of the industry, the Serbian government, and academic institutions, we have found a consensus that this industry is growing and well positioned for future growth. Most of the growth should come from cultivated herbs, but since the government has increased quotas for mushrooms and forest fruit based on 10 years of annual scientific surveys about the sustainable rate of natural resources, there is also some room for short-term quantity and price increases in the traditional wild mushroom and forest fruit sector. The way to achieve this is by taking progressive firms to trade shows, using short-term technical assistance, and forming strong producer associations.

Given the market opportunities discussed above, work with the subsector will focus on **cultivated herbs, forest fruit, and both cultivated and wild mushrooms**, which all have great export potential. The main opportunities lie in supporting value-adding processing of collected MAPs, with better marketing and organic certification, leading to increased sales, as final products rather than bulk goods, both domestically (thus decreasing imports) and abroad (thus increasing exports). With the project's intervention, improved market linkages may trigger better vertical and horizontal cooperation among the value chain's stakeholders, which in turn may lead to higher volumes of cultivated herbs and mushrooms and to expansion of farm and retail sales and employment.

According to the survey conducted by our team, there is unmet demand of \$700,000 per year for **processed herbs** (including fresh-packed culinary herbs, spice blends for retail, mixtures of medicinal herbs, herbal dietary supplements, and essential oil extracts) in national, regional, and EU markets. Also, there is unmet and growing demand of \$20,000 per year on the domestic market and \$1 million per year at EU of **processed mushrooms and forest fruit** (end-user products). Only 4.4 percent of Serbia's mushroom exports (in terms of quantity) are processed as final products. Serbian processors/exporters, such as Herba, Melisa, Fruktus, BMD, Bilje Borca, and Adonis, have shown that final products can penetrate even the EU market. Insufficient knowledge about market opportunities, and lack of a modern marketing approach at the company level, will be the main points of intervention. Addressing these constraints will encourage companies like those mentioned above to invest in modern processing equipment to introduce new products and add value to existing ones. Approximately \$30 million in additional exports and \$25 million in additional domestic sales can be achieved in this way over the life of the project.

A growing demand for fresh herbs, mushrooms, and forest fruits by processors in Serbia is expected. At the moment, as noted earlier, there is unmet demand of \$2 million per year for fresh or primary processed **wild** herbs, mushrooms, and forest fruits, and another \$2 million per year for fresh or primary processed **cultivated** herbs. For the moment, due to the risk of overharvesting, the project will not work directly on increasing the volume of herbs, mushrooms, and forest fruits collected from nature. However, we will strengthen existing collectors' organizations so that they can play a more active role in establishing quotas, since the existing ones are still very restrictive, according to subsector stakeholders. Meanwhile, introducing organic wild herbs, mushrooms, and forest fruits on the market is a great chance to add value to the products—one that the project will take advantage of. Building awareness of market opportunities and increasing collectors' knowledge of required harvesting techniques and certification procedures will be the main points of intervention. At the same time, the program will help expand the area where herbs are cultivated by increasing awareness of existing demand. In cooperation with supporting institutions,

ABDS providers, and processors, we will link processors and POs to increase processor-driven production (growing to order) and conduct training programs for POs and interested farmers.

Cultivated mushrooms lack significant export potential, since almost all of what is produced is sold domestically through small retail shops and supermarkets.

Forest fruits, mostly wild berries, are very important for the ability of berry processors to diversify their final products (various frozen berry fruit mixtures). Since stakeholders in the herbs, forest fruits, and mushrooms value chain, except for collectors, rarely deal with wild berries, this segment should be considered an opportunity for stakeholders in the cultivated berry value chain, especially processors and exporters.

The following table lists the main growth opportunities that can be derived from the previous analysis. For each key constraint identified, we propose a set of actions to be implemented under the project.

TABLE 4: MARKET OPPORTUNITIES, CONSTRAINTS, AND ACTIVITIES AT POINTS OF LEVERAGE

Major Opportunities	Constraints Standing in the Way of Each Opportunity	Points of Leverage for Specific Targeted Interventions or Activities
<p>1. Unmet demand of \$2 million per year for fresh wild herbs, mushrooms, and forest fruit by processors in Serbia and abroad.</p> <p>Justification: Major importers, such as Germany's Martin Bauer Company, claim that they could buy twice what they are currently buying from Serbia, but cannot obtain sufficient supply (they note that this is typical of a smaller country such as Serbia, with a relatively small area producing the product).</p>	<p>a) Low prices offered to collectors caused by low average quality of delivered goods</p> <p>b) (in some cases) very low quotas established/ approved</p>	<p>a) Improve organization and cooperation among stakeholders to enable better planning and avoiding unnecessary costs</p> <p>b) Through training programs, improve harvesting and storing techniques and introduce good agricultural practices</p> <p>c) Through promotion and assistance to value-added processing (product development, branding, marketing, etc.), increase both processors' and collectors' margins</p> <p>d) Work with POs and relevant authorities on improving the quota system through establishing more realistic quotas and better monitoring</p> <p>Illustrative Example:</p> <ul style="list-style-type: none"> • Intervention costs: \$50,000 per year • Impacts expected: improved quality and increased value of 1,000 tons of commodities by \$300,000
<p>2. Unmet demand of \$700,000 per year for processed herbs in national and international markets, including fresh-packed culinary herbs, spice blends for retail, mixtures of medicinal herbs, encapsulated herbal dietary supplements, and essential oil extracts</p>	<p>a) Insufficient knowledge related to market opportunities</p> <p>b) Insufficient know-how related to processing of MAPs</p> <p>c) Lack of modern processing equipment</p> <p>d) Lack of modern marketing approach</p>	<p>a) Through training programs prepared in cooperation with SIEPA and selected ABDS providers, and by participation at trade fairs, increase exporters' knowledge of end-user requirements and preferences, market access conditions, and appropriate marketing channels and techniques</p> <p>b) Conduct a preliminary transmission of import requirements and regulations to suppliers and exporters to allow them to reach the high standards of quality and sophistication required in the international markets</p> <p>c) Through a series of training programs and</p>

Major Opportunities	Constraints Standing in the Way of Each Opportunity	Points of Leverage for Specific Targeted Interventions or Activities
		<p>study tours, strengthen the capacity of subsector business associations and enable them to play a central role in this respect</p> <p>d) In cooperation with commercial banks, the Serbian Development Fund/National Investment Plan, and foreign credit lines, develop specific loan programs for such businesses and present available options</p> <p>e) Develop and conduct training programs in marketing and study tours in cooperation with SIEPA</p> <p>Illustrative Example:</p> <ul style="list-style-type: none"> • Intervention costs: \$100,000 per year • Impacts expected: total value of marketed processed herbs increased by \$300,000 in the first year
<p>3. Demand of \$2 million per year for <i>cultivated</i> herbs and mushrooms by processors in Serbia and abroad—demand that is both unmet and moderately increasing (3% to 8% annually). This is the figure derived from interviews conducted by our team; however, other opportunities are known as well and will be investigated to determine future activities.</p>	<p>a) Small acreage where herbs are cultivated</p> <p>b) Growers unaware of existing demand for these products</p> <p>c) Lack of growing/harvesting equipment</p> <p>d) Insufficiently diversified production</p> <p>e) Insufficiently developed supply chain</p>	<p>a) b) c) and e): in cooperation with support institutions, ABDS providers, and processors, conduct training programs for POs and interested farmers in Serbia</p> <p>e) Through exchange tours emphasizing information dissemination and know-how—even using grants, where feasible—assist supporting institutions and/or selected private nurseries in introducing new species for cultivation in Serbia</p> <p>Illustrative Example:</p> <ul style="list-style-type: none"> • Intervention costs: \$200,000 per year • Impacts expected: total value of new species grown increased by \$200,000 in the first year
<p>4. Unmet and growing demand of \$20,000 per year in the domestic market for processed mushrooms and forest fruit (including fresh-packed mushrooms and forest fruit, mixtures of frozen forest fruit for retail, pickled mushrooms and forest fruit preserves in retail packages, etc.).</p>	<p>a) Processors unaware of growing demands for processed mushrooms and forest fruits</p>	<p>a) By linking processors and supermarket chains, strengthen the value chain and enable better planning of production and sales of these products</p> <p>Illustrative Example:</p> <p>Intervention costs: \$10,000 per year</p> <p>Impacts expected: total value of domestic sales increased by \$250,000 in the first year</p>

Major Opportunities	Constraints Standing in the Way of Each Opportunity	Points of Leverage for Specific Targeted Interventions or Activities
<p>5. Unmet demand of \$1 million per year for processed mushrooms and forest fruit (<i>end-user products</i>) from Serbia on the part of EU countries. Currently only 4.4% of Serbia's mushroom exports (by quantity) are processed (beyond being dried and packed); with project assistance, its quantity and share will triple within 5 years (i.e., the quantity exported will rise to 350 tons, which will represent 13% of total mushroom exports)</p>	<p>a) Insufficient processors' knowledge related to market opportunities b) Insufficient know-how related to processing of mushrooms and forest fruit c) Lack of modern processing equipment d) Lack of a modern marketing approach</p>	<p>Same as 2-a-b-c-d</p> <p>Illustrative Example:</p> <ul style="list-style-type: none"> • Intervention costs: \$100,000 per year • Impacts expected: total value of processed products' sales increased by \$200,000 in the first year
<p>6. Unmet demand of \$1 million per year for organic herbs, mushrooms and forest fruit from Serbia on the part of EU countries. This is the figure derived from interviews conducted by our team, but with the growth in the organic sector, could be greater.</p>	<p>a) Producers are unaware of market opportunities b) Little knowledge of required harvesting/growing techniques and certification procedures</p>	<p>a) Same as 2-a-1 b) Training/consulting and certification programs to be conducted in cooperation with business associations and selected ABDS providers</p> <p>Illustrative Example:</p> <ul style="list-style-type: none"> • Intervention costs: \$100,000 per year • Impacts expected: 5 processors certified; total value of sales of organic products increased by \$100,000 in the first year

SUMMARY OF EXPECTED RESULTS FROM ACTIVITIES

As result of above activities, we expect the following impacts to be achieved within a one-year period:

- 500 collectors trained in how to start growing selected MAPs and mushrooms.
- 50 collectors converted from collecting to growing MAPs.
- “How to Grow MAPs” booklet and/or GACP guidelines produced and delivered to at least 500 interested farmer households.
- 5 POs and 5 businesses trained/have entered training program related to meeting requirements of good agricultural practices (GAP), organic and food-safety standards.
- 5 processors assisted in establishing value-added processing operations through product development, branding, marketing, or similar efforts.
- 5 POs and/or processors assisted in establishing/strengthening contract-based long-term cooperation along the supply chain.
- At least 1 selected qualified nursery plant trained in planting material production techniques, and an action plan developed.
- Total value/incomes generated within the subsector increased by \$2 million.
- Annual exports increased by \$1 million.
- 70 new jobs created.

APPENDIX

**TABLE 5: SERBIAN GOVERNMENT ANNUAL WILD PLANT HARVEST LIMITS, 2000–2007
(LEADING WILD SPECIES COLLECTED IN SERBIA 2000–2007, QUANTITIES IN KG)**

#	Description		2000	2001	2002	2003	2004	2005	2006	2007
	Latin	English								
1	<i>Boletus edulis</i>	Porcini	1,723,391	941,323	1,144,621	1,302,493	2,934,992	3,584,300	No Change Reported	4,000,000
2	<i>Cantharellus cibarius</i>	Chanterelles (fox mushrooms)	807,429	400,989	452,064	405,500	744,500	1,274,700	No Change Reported	1,500,000
3	<i>Fragaria vesca</i>	Wild strawberries	11,625	5,206	4,550	2,740	14,530	20,690	No Change Reported	150,000
4	<i>Juniperus communis</i>	Juniper	258,420	-	31,385	10,150	206,850	200,980	No Change Reported	2,000,000
5	<i>Rosa canina</i>	Rose hips	-	56,626	32,988	46,250	568,504	296,984	No Change Reported	5,000,000
6	<i>Rubus ulmifolius</i>	Wild blackberries	4,456	2,245	8,090	25,956	4,200	44,940	No Change Reported	2,000,000
7	<i>Vaccinium myrtillus</i>	Wild bilberries	253,460	166,120	180,512	488,450	277,105	680,850	No Change Reported	2,000,000
8	<i>Craterellus cornucopioides</i>	Black trumpets	65,000	84,000	11,000	29,240	12,500	92,000	No Change Reported	No Change Reported
9	<i>Lactarius deliciosus</i>	Lactarius, milk-caps	20,000	15,200	-	24,000	61,000	29,000	No Change Reported	No Change Reported
10	<i>Hypericum perforatum L.</i>	St. John's wort (chantarion)	Not Covered, Not Applied	200,000						
11	<i>Rubus fruticosus L.</i>	Wild blackberries and strawberries	Not Covered, Not Applied	2,000,000						
12	<i>Rubus idaeus L.</i>	Wild raspberries	Not Covered, Not Applied	100,000						
13	<i>Thymus sp.</i>	Thyme	Not Covered, Not Applied	300,000						
14	<i>Tuber magnatum</i>	White truffles	Not Reported as Covered	30						

Source: Department for Environmental Protection, Belgrade and Ministry of Science and Environment.

TABLE 6: MEDICINAL HERB EXPORTS AND IMPORTS INTO SERBIA, QUANTITY AND VALUE

Medicinal Herbs Exported and Imported, Serbia 2003–2005

Year	Export		Import	
	Quantity, in tons	Value, \$000	Quantity, in tons	Value, \$000
2003	1,307	3,001	372	1,005
2004	1,124	3,274	503	1,393
2005	1,078	3,697	491	1,305

Source: Serbian Chamber of Commerce

