PROFILE OF SAMDRUP JONGKHAR

APPENDICES

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APPENDIX 1: Objectives and methodology related to field research

1. Objectives:

The research dimension of the Samdrup Jongkhar Initiative is seen as essential to the success of the initiative itself to provide a solid basis and ground for well-founded GNH-based regional development and to ensure its success over time. The evidence in this *Profile of Samdrup Jongkhar* is based on both quantitative data and qualitative field research. The former includes both published statistics from as wide range of sources as could be found and previously unpublished micro-data files on the region kindly provided to the Samdrup Jongkhar Initiative by the National Statistics Bureau. Here we describe the qualitative field research.

Qualitative research for this study consisted of (i) direct observation, (ii) in-depth interviews with villagers and farmers, shopkeepers, educators, basic health unit personnel, and elected village leaders and local officials, and (iii) group discussions.

(i) Direct observation and recording: During village visits, the field researchers noted down their direct observations about visible characteristics such as housing quality, building materials used, how prosperous or poor the village appears, what crops are seen growing in nearby fields, and more. Also noted were observations about the terrain — how steep or flat the land is — and how far the village is from the nearest road head. These observations were noted so that comparisons could be made later about which villages, for example, seemed the poorest and perhaps in greatest need of development assistance and by contrast, which seemed more prosperous.

(ii) In-depth interviews with villagers, farmers, etc.: Agriculture was the primary focus of questioning in the village visits. For example, questions were asked about what is currently grown both for personal consumption and for cash crops. Farmers were also asked about what used to grow well there – i.e. crops sown by their grandparents – which they do not grow any more, and why. Questions were asked about the challenges facing the farmers, such as water shortages, storage issues, human – wildlife conflict and crop damage, soil quality, erosion problems, insect or disease problems and for which crops, marketing issues, and transportation issues. Villagers were also asked about proportions of food lost due to wild animal raiding, inadequacy of storage, and pest/disease damage.

Questions regarding how much of their dietary consumption was imported from India were intended to ascertain how self-sufficient Samdrup Jongkhar villagers already are in terms of food production. This line of questioning was related to a key SJI project goal of improving food self-sufficiency. Since Samdrup Jongkhar borders Assam, it was

particularly important to assess from both observation and questioning what is currently imported from India, and the approximate quantities.

Farmers were also asked if they used chemicals on their crops (pesticides, fertilisers, weedicides, fungicides, etc.) or artificial fertilisers (i.e. urea) in the soil. Questions were also asked about seed sources and seed saving, and about the forms of animal rearing undertaken.

Many of the questions were open-ended—simply designed to get farmers talking about key issues that cannot be anticipated and enabling researchers to collect information on important questions that they may not think to ask. Such open-ended questions included: "What do you like best about your village?" "What are the biggest challenges you face in your community / village?" "What challenges do you face in farming?" "Are your children interested in farming?" etc. Open-ended questions were often followed up more specifically by researchers asking if any of the following were problems in this area □ land or labour shortages, lack of training, low soil fertility, pests and diseases, wild animals, too much or too little rain, lack of marketing opportunities, etc.

To lay the groundwork for exploration of economic diversification opportunities, researchers asked about existing skills and knowledge in the village such as local crafts, and they observed what local artisans produce. Villagers were asked about what craft skills or handicrafts were characteristic of their village and they were then asked to name local artisans who do particularly good work in weaving, bamboo, and other crafts. In order to identify potential eco-tourism opportunities, researchers also investigated — to the extent possible, given time, resource, and transportation constraints, □ which parts of the dzongkhag were particularly beautiful and where there might be opportunities for eco-tourism or trekking.

Questions were also asked about the availability of educational facilities, how far children need to walk to school, and whether the local children are boarded elsewhere. Issues around rural-urban migration were also explored and, to the extent possible, young people were asked questions about how they feel about staying in their village, whether they plan to move and if so where, and whether they would stay in the area if there were decent economic opportunities.

To the extent possible, field researchers tapped into traditional knowledge and some of the accumulated local wisdom and innovation present in the villages: What sources of *wild* biodiversity, such as forest products, vegetables, medicinal herbs, and other materials, used to be a source of livelihood, food, and usage.. In order to investigate what types of "forgotten foods" might be reintroduced, questions were also asked on crops traditionally grown but no longer prevalent.

Questions were also asked with regard to the opportunities and challenges the villagers face in terms of improving rural livelihoods, and what their greatest perceived needs are. For example, are there untapped assets and talents on which the villagers can build, and

are there shortages of time, resources, or infrastructure that might be addressed through appropriate technology innovations?

(iii) Group discussions: As many of the village visits attracted between 20 and 50 villagers from the surrounding area—resulting in a number of "group discussions"—researchers did not feel it necessary or particularly advantageous to organise "focus groups" in addition to these.

2. Study Area:

The study area is the Samdrup Jongkhar Dzongkhag and its eleven gewogs. Please see Appendix 2 for a complete list of the villages visited during the field research through the winter of 2010-11, as well as a list of interviews conducted with officials and village spokespeople who attended the SJI Launch in December 2010.

3. Methodology:

Samdrup Jonghkar has a total of eleven gewogs: Dewathang, Orong, Gomdar, Wangphu, Martshala, Phuntshothang, Pemathang, Samrang, Lauri, Serthi, and Langchenphu. But these differ widely. On the one hand, for example, there is Dewathang Gewog—accessible by road from both India and from within Bhutan—and on the other hand there are have places like Lauri—with no road access and at least a two day journey by foot from the nearest road. Similarly, Serthi, Wangphu, and Samrang are between 4-5 hours walk from the nearest farm road. As such, it was not possible, given the time, transportation, and other logistical constraints (see *Research Constraints* below) for the researchers to visit all the gewogs in Samdrup Jongkhar Dzongkhag.

To the extent possible, given these constraints, representative villages were selected based on accessibility and consultations with local officials. Where it was not possible for the researchers to go to the villages, the research team took advantage of the presence of villagers from all eleven gewogs at the three-day SJI launch— held in December 2010 at the Chokyi Gyatso Insititute in Dewathang in order to conduct further interviews.

All individual and village visit conversations and interviews were tape-recorded. Respondents were assured of complete confidentiality. Interviews were mostly conducted in Sharchop or Nepali, and sometimes in Dzongkha or English when talking with officials. Bhutanese translators were part of the research team and assisted with translation and transcriptions into English.

4. Research constraints:

To the extent possible, researchers assessed the views and perspectives of different groups within a village, including women, the elderly, and youth. However, in many cases, these groups seemed uncomfortable providing viewpoints that differed from those of the men, who tended to dominate during the group discussions.

Not surprisingly perhaps, a high proportion of the field interviews were conducted in villages that were accessible by road (including farm roads). Also, since the research team was stationed in the town of Dewathang during the winter and spring of 2010-11, Dewathang Gewog is disproportionately represented in this study.

Similarly, in order to present as representative a sample of the dzongkhag as possible, and since a significant portion (possibly as high as 30%) of the population in Samdrup Jongkhar are Lhotshampa (Nepali-speakers), the researchers tried to access this population for interviews in the southern portions of the dzongkhag, where they tend to reside (i.e. Phuntshothang, Samrang, Langchenphu).

However, it was difficult and in some cases not possible to access these areas. For example, it was not possible to visit Samrang or Langchenphu. Samrang was restricted for reasons that were never clearly communicated to the research group, but there is indication it had something to do with discomfort and sensitivities on the part of local officials in Phuntshothang with the possibility of interviewees referencing the unrest of the early 1990s. The researchers' interest was in the living standards, agriculture, and other current realities of the populace, but they could not discount the possible influence of historical factors on present conditions.
The researchers were also not able to visit Langchenphu or the other eastern-most gewogs, which are accessible via India only, because they did not have sufficient visa entry permits. However, it is also important to note that Lhotshampa did participate in a number of field interviews in Pemathang and Phuntshothang Gewogs, though it is not known if these interviews are representative of this group overall. From a purely demographic perspective, however, Lhotshampa are likely under-represented in the field interview sample in relation to their actual proportion of the Samdrup Jongkhar population.

We were also not able to visit Lauri or Serthi, the poorest gewogs, which are not accessible by road. It is hoped that the Samdrup Jongkhar Initiative will continue field research into these more remote areas and into the areas that were not visited to date.

From a development perspective, however, it is important to note in this regard that the Samdrup Jongkhar Initiative has a policy of complete inclusion and non-discrimination in regard to all the groups referenced above and indeed to the whole populace of Samdrup Jongkhar. Particular efforts have been made to ensure inclusion of representative samples of women, all age groups, Lhotshampas, and remote gewogs, in farmer trainings, including the three-week organic study tour to India, outreach, and other activities.

Gewogs and distance(s) from Samdrup Jongkhar Dzongkhag headquarters in Samdrup Jongkhar town

1. **Dewathang:** 18.0 km *S/Jongkhar to Trashigang Highway.*

2. **Orong:** 62.5 km *Including 12 Kms farm road from Shekpashing*

3. **Gomdar:** 71.8 km *Including 11 Kms farm Road from Narphung. (under construction)*

4. **Wangphu:** 71.8 km + *4 hours walk from Gomdar to Wangphu Gewog*

5. **Phuntshothang:** 68.0 km *Dzongkhag road*

6. **Pemathang:** 77.0 km *Including 9 Kms Feeder Road from Samdrupchoeling.*

7. **Samrang:** 77.0 *km + 5 hours walk from Diglai Khola (Pemathang) to Samrang Gewog*

8. **Martshala:** 81.0 km *Including 13 Kms farm road from Tsangchuthama*

9. **Langchenphu**: 190.0 km *Through India via. Rangia and Rowta, Assam (4 hours journey)*

10. **Serthi**: 199.0 km *Including 9 Kms farm road from Jomotsangkha to Gelongkhar + 4 hrs walk from Gelongkhar*

11. **Lauri:** 199.0 km + *two days journey by foot from Gelongkhar to Lauri Gewog*

APPENDIX 2: Interviews and village visits — Samdrup Jongkhar Initiative research

November–December 2010
January 2011

Date	Village/town (Gewog)	Interviewee/Number of Villagers	Comments
Nov. 15	Samdrup Jongkhar	Phub Tshering – Dzongdag	Samdrup Jongkhar Dzongkhag
Nov. 15	Samdrup Jongkhar	District Agriculture Officer	Samdrup Jongkhar Dzongkhag
Nov. 16	Dewathang	Gup Dozang	Dewathang Gewog
Nov. 16	Dewathang	Agriculture Extension Officer	Dewathang Gewog
Nov. 17	Rishore Village and Coal Mine *(Dewathang)*	30 villagers gathered	Representative mix of men, women and children, of various ages
Nov. 18	Chennari Khorpan *(Dewathang)*	30 villagers gathered in Chennari	Representative mix of men, women and children, of various ages
Nov. 19	Samdrupgatshel *(Dewathang)*	Ugyen Taujay	Former Forest Ranger
Nov. 19	Samdrupgatshel *(Dewathang)*	25 villagers gathered	Representative mix of men, women and children, of various ages
Nov. 22	Bangtsho Kopur *(Dewathang)*	20 villagers gathered in Kopur	Representative mix of men, women and children, of various ages
Nov. 23	Dewathang	Tashi Tobgyel, Chair of Dewathang Milk Marketing Cooperative	Business representative, Dewathang
Nov. 24	Rikhey *(Dewathang)*	50 villagers gathered	Representative mix of men, women and children, of various ages
Nov. 25	Domphu Dungkharcholing Kheri *(Dewathang)*	25 people gathered	Representative mix of men, women and children, of various ages

Date	Village (Gewog)	Interviewee/Number of Villagers	Comments
Dec. 3	Dewathang	Khenpo, Chokyi Gyatso Institute	Buddhist Monastery
Dec. 6	Dewathang	Rinzin Dorji, Principal of the Garpawoong Lower Secondary School	Principal and local artisan
Dec. 7	Dewathang	Karma Yangzom Weaver	Local artisan and possible weaver trainer
Dec. 8	Dewathang	Tenzin Dema, Agriculture Extension Officer (#2)	
Dec. 8	Dewathang	30 villagers gathered in field at Dewathang Primary School	Meeting convened by Tashi Dorji, SJI
Dec. 9	Dewathang	Sonam Gyeltshen	Large-scale orange farmer
Dec. 14	Mantsang *(Orong)*	35 villagers gathered	Selected Mostly men, some women and children
Dec. 17	Tashiphu, Sherjong Dunmanama Patpanadang *(Lauri)*	6 villagers (village spokesmen)	Interview conducted at the SJI Launch, not in Lauri. Only men from gewog.
Dec. 17	Denphu, Sasker, Minziwoong, Pangthang *(Serthi)*	3 villagers (villages spokesmen)	Interview conducted at the SJI Launch, not in Serthi. Only men.
Dec. 17	Daifam *(Langchenphu)*	4 villagers (village spokesmen)	Interview conducted at the SJI Launch, not in Langchenphu. Only men.
Dec. 19	*Samrang*	1 spokesperson	Interview conducted at SJI Launch.

Date	**Village** *(Gewog)*	**Interviewee/Number of Villagers**	**Comments**
Dec. 2	Bhangtar *(Phuntshothang)*	Village spokesperson	Gup's Office
Dec. 3	Bhangtar *(Phuntshothang)*	Gup	
Dec. 3	Bhangtar *(Phuntshothang)*	Dhungpa	
Dec. 3	Tshangchuthama *(Phuntshothang)*	Village family	
Dec. 4	Metophang *(Phuntshothang)*	Village family	Lhotshampa
Dec. 4	Dungkarling *(Phuntshothang)*	Village Tshogpa[1]	
Dec. 4	Bhangtar *(Phuntshothang)*	Sonam Rinchin	Businessman and community leader
Dec. 5	Bhangtar *(Phuntshothang)*	Village Tshogpa and village interview	25 villagers, 15 men and 10 women
Dec. 5	Bhangtar *(Phuntshothang*	Tshogpa, business community	
Dec. 6	*(Pemathang)*	Village Tshogpa #1	
Dec. 6	*(Pemathang)*	Village Tshogpa #2	
Dec. 6	*(Pemathang)*	Village Tshogpa #3	
Dec. 6	*(Pemathang)*	Village Tshogpa #4	
Dec. 6	*(Pemathang)*	Village Tshogpa #5	
Dec. 7	Bauney *(Phuntshothang)*	Tshogpa and villagers	21 villagers, 10 women, 11 men
Dec. 7	Bauney *(Phuntshothang)*	Women villagers	
Dec. 9	Gotungma Tishure *(Martshala)*	Tshogpa and 4 farmers	
Dec. 9	Martshala *(Martshala)*	Martshala Gup and Mangi Ap	
Dec. 10	Martshala *(Martshala)*	Riki Wangchuk, Martshala Agriculture Extension Officer	

[1] Tshogpa is village head; Gup is gewog head.

Dec. 10	Richang *(Martshala)*	Jigme Dorji, Richang Tshogpa (conducted in Martshala)	

Date	**Village** *(Gewog)*	**Interviewee/Number of Villagers**	**Comments**
Dec. 30	Khataethang Khamethang Belamsharang Sangshingzor *(Phuntshothang)*	38 villagers from 4 villages gathered at the vegetable market in Bhangtar	22 were men and 16 women. Majority Lhotshampa
Jan. 2	Martang *(Dewathang)*	30 villagers	24 women and children and 6 men
Jan. 11	Tsangchello *(Gomdar)*	Village clerk and another Tshogpa (from Bromshing who happened to be there), primarily the former	As there was no gup in Gomdar at the time, Mangiap was interviewed later
Jan. 12	Amshing *(Gomdar)*	Tshogpa and 8 villagers	5 men, 4 women
Jan. 12	Khoyar Pangthang *(Gomdar)*	Tshogpa and 5 villagers	2 women, 4 men, same tshogpa as Amshing
Jan. 13	Gomdar Village *(Gomdar)*	Tshogpa and 3 villagers	Interview took place in Tsangchello, 4 men
Jan. 13	Tsangchello *(Gomdar)*	Tshogpa and 4 members of the business community	5 men, one woman
Jan. 13	Tsangchello *(Gomdar)*	Agricultural Extension Officer (Tshetin Dukpa)	
Jan. 14	Premi & Barzur *(Gomdar)*	Tshogpa and 3 Villagers	Interview took place in Tsangchello, 4 men
Jan. 14	Bromshing *(Gomdar)*	Tshogpa and one villager	Interview took place in Tsangchello, two men. Tshogpa is also clerk of Gomdar gewog
Jan. 14	Gomdar	Mangiap	

Date	Village *(Gewog)*	Interviewee/Number of Villagers	Comments
Jan. 15	Wangphu Village *(Wangphu)*	Tshogpa and 14 villagers	8 men, 7 women
Jan. 15	Wangphu Village *(Wangphu)*	9 women	Women-centered interview
Jan. 15	Woosoong *(Wangphu)*	5 villagers	3 men, 2 women
Jan. 15	Wangphu	12 youth [8 men, 4 women] from various nearby villages	Informal, youth-centered interview
Jan. 16	Panthang *(Wangphu)*	16 villagers, including tshogpa	7 men, 9 women
Jan. 16	Wangphu Village *(Wangphu)*	Agricultural Extension Officer	
Jan. 17	Shopshi *(Wangphu)*	Gup, Thinley Dorji	
Jan. 17	Shopshi *(Wangphu)*	23 villagers, including tshogpa	11 men, 12 women
Jan. 18	Morong & area *(Orong)*	15 villagers, including tshogpa	8 men, 17 women

APPENDIX 3: Dzongsar Jamyang Khyentse Rinpoche — Remarks to the Samdrup Jongkhar Initiative Launch, December 2010 [2]

Lots of changes and considerable progress are taking place in Bhutan. Some of these changes might seem good now, but could have harmful effects later. So we have to create those changes that will bring the greatest benefit. We now have democracy in place in Bhutan, and it is therefore important for us as citizens of Bhutan to shoulder our responsibilities and fulfill our responsibilities and activities properly. That's why I suggested starting a Samdrup Jongkhar Initiative to develop this region well and properly.

This should be a real people's initiative and not the kind of formal organization that too often gives its members some sense of self-importance and exclusivity. It must also be completely apolitical. Although religion is deeply woven into our lives in Bhutan, the Samdrup Jongkhar Initiative should also not have any religious trappings at all. So what then ***is*** the Samdrup Jongkhar Initiative?

Bhutan has been fortunate. With far-sighted vision, our Kings have guarded the wellbeing of the Bhutanese people for generations. And while Bhutan learns the ways of the modern world, it has so far done so without losing the essence of our unique wisdom culture, our unique thinking and mentality, and our care for the natural world. So far at least, all these attributes have not diminished, and a lot of the credit for this goes to our monarchs.

So why then do we need a Samdrup Jongkhar Initiative? Well, we are now a democracy and so our people and all Bhutanese citizens have a responsibility. The meaning of the word "initiative" includes carrying or shouldering responsibility. It means carrying our responsibility without someone else having to tell us what to do and without the prodding of a cowherd. It is us fulfilling our responsibilities for ourselves, for our children, and for future wellbeing. Taking such an initiative and to be concerned in this way — that is the main aim of the Samdrup Jongkhar Initiative.

The government has looked after us and taken care of us like a mother after a child even beyond the stage that it should, and even after the child has grown up. But we are now like 16-year old teenagers, and should take responsibility. With democracy in place, the caretaker and the custodian of Bhutan and of her culture, education, environmental preservation and protection, our unique philosophy and psyche, our thinking, should not be just the government and the work of a department alone.

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[2] Dzongsar Jamyang Khyentse Rinpoche, is Director, Chokyi Gyatso Institute for Buddhist Studies, Dewathang, Samdrup Jongkhar, Bhutan, and founder of the Samdrup Jongkhar Initiative.

Once a child grows up, it should not expect its parents to take care of everything. If the child reaches the age of 16 or 20 and still expects its parents to look after it completely, then that is not good. Likewise, the people of Bhutan should now work sincerely to develop themselves in harmony with our government and the vision of our King. In doing so, we have to think not only of the present but of the generations to come in the future.

Coming to Gross National Happiness, we should not only engage in talk but also translate it into action — to "walk the talk." And in doing so, we should not wait for others. Rather, all of us, each one of us on our own and together, being concerned, should shoulder our full responsibilities, and we should start working in harmony with the country's GNH philosophy.

The government is doing its job, and in the future also, the hope is that it will continue to do so. But we have to do our bit and not just leave it to the government. After all, it is for us that these actions are being taken. We have also become too dependent on aid from other countries. A mentality of dependence like that means that we can never mature and grow up. So being self-reliant and realizing our potential through our own efforts is a key goal of the Samdrup Jongkhar Initiative.

In our villages, the trend has set in where our youth want to go to Thimphu and to the urban areas. These days you can no longer say things like "you cannot go" and "you should not go." But why are our young ones wanting to go to the urban areas? Often they end up having no jobs, or getting jobs that are not up to their expectations, and then they get exasperated and land up in situations where they feel ashamed to go back to their homes and end up abusing drugs or drinking alcohol.

How can we stem this flow of our youth to the urban areas? We cannot use force and threat. Within Samdrup Jongkhar and Dewathang, what are the things that we can do to create the enabling environment and conditions that will keep our young men and women here? And how can we change our way of thinking so that our young people will respect the dignity of all labour, and not aspire only to be civil servants.

As I say these words, I am reminded of this way of thinking that many of us have — a tendency amongst us to think: "We cannot do this. This is un-doable." We should do away with such thinking and abandon such thoughts. Even if something does not work completely this year or next year, if we start our project now, we have to think long term. If we begin our activities now and start now, then even if we are not able to accomplish our aims during our lifetimes, it is not a problem because they ***will*** bear fruit in our children's lifetime. ***If we don't do this now, it will be too late later.***

Dewathang and Samdrup Jongkhar are fertile areas and receive abundant rainfall. Yet we still get our food and vegetables from outside. How can we be self sufficient and feed ourselves? How can we inculcate such thinking? How do we make our people think in those terms and in terms of environmental conservation and ecological awareness and prevention? ***Education is the key.*** With the Samdrup Jongkhar Initiative, we also want to

go beyond the common, established, and prevalent view that rituals and chanting constitute religious practice, and instead really integrate spiritual practice fully into our lives.

I really want to thank the many people — villagers, teachers, business folk, farmers, doctors, civil servants, and others — who have come together to launch this Samdrup Jongkhar Initiative. The Samdrup Jongkhar Initiative has been started with good intention and we should all rejoice and appreciate. If this goes well, this initiative could be replicated in many other districts and throughout the country.

APPENDIX 4: Samdrup Jongkhar issues by category and region

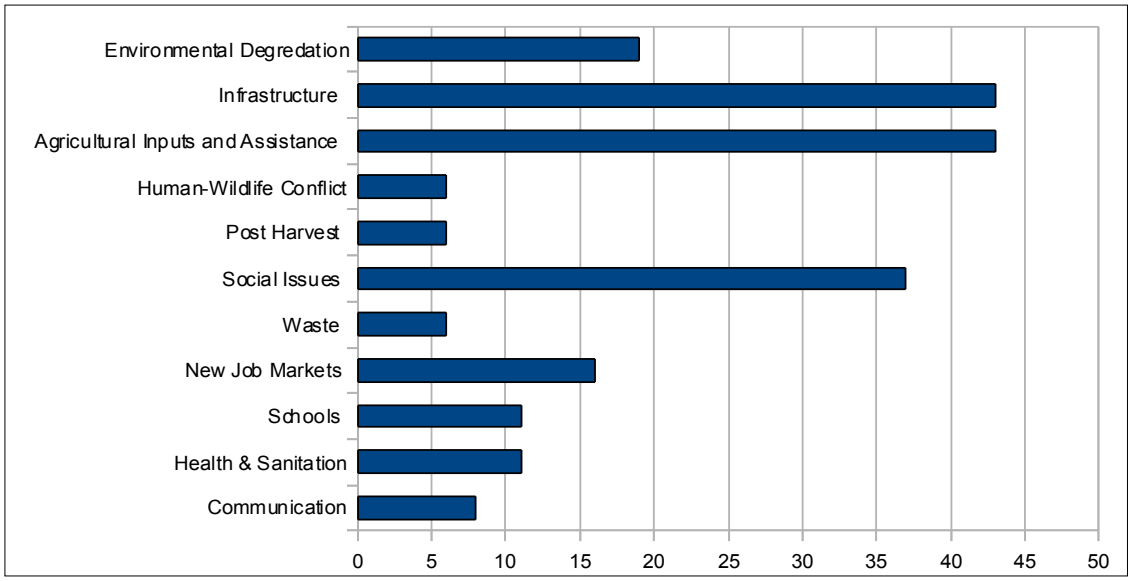
The Samdrup Jongkhar Initiative Launch on 18-20 December was attended by 500 representatives from throughout the dzongkhag, with all eleven gewogs represented. Breakout groups were held on two of the days, with villagers clustered by gewog, to discuss and identify the key assets, challenges, and opportunities in each region.

The material in this Appendix is based on an analysis of the notes gathered by each of the breakout group facilitators and rapporteurs. Issues by category, as listed below, are therefore based on the SJI Launch breakout group sessions, beginning with a summary of key issues referenced widely in several breakout groups. This summary list of issues is followed by specific issues referenced in the gewog-specific breakout group discussions, extensively supplemented by researcher field notes based on village visits and interviews.

The following list is not in order of priority given by discussants. But it is noteworthy that the most widely referenced issues were infrastructural and agricultural, followed by social issues and then environmental ones (see chart below). When post-harvest issues and human-wildlife conflict are added to the agriculture-related issues raised, it is clear that agriculture remains the dominant reality in the lives of Samdrup Jongkhar residents. Here we simply list some of the key issues raised by breakout group discussants within each of the following categories.

- ENVIRONMENTAL DEGRADATION: deforestation, coal mining, chemical agriculture, loss of biodiversity, climate change
- INFRASTRUCTURE:
    a. Roads: access to markets, healthcare, schools, etc.
    b. Water: insufficient irrigation, unsafe drinking water
    c. Electricity
    d. Schools: quality, drop-outs, walking long distances in monsoon, landslide prone areas, fatigue and sickness from walking affects studies, no lunch provided
- AGRICULTURE INPUTS AND ASSISTANCE: food security, access to best farming practices, land productivity and fertility, testing for soil, disease and pests, going organic, tools & machinery
- HUMAN—WILDLIFE CONFLICT
- POST-HARVEST: food processing, storage, value addition
- SOCIAL ISSUES: Loss of culture and tradition, rural-urban migration, lack of local leadership, drug and alcohol consumption, social inequity, literacy, security
- WASTE: reducing, upcycling, composting, management systems
- NEW JOB MARKETS: tourism, small/local industry, exports
- HEALTH & SANITATION: drinking water, hygiene, access to healthcare facilities
- COMMUNICATION: local radio, access to information, T.V., internet

Appendix 4 Chart: Issue breakdown based on SJI Launch breakout groups, 18-20 December 2010, CGI, Dewathang. (NOTE: Following breakdown is determined by frequency of appearance in notes from breakout groups, SJI Launch).



SAMDRUP JONGKHAR ISSUES BY REGION:

Issues by region listed below are from both the SJI Launch breakout notes and also the field notes and village interviews conducted by the Dewathang-based research team. Each section below begins with issues widely referenced by villagers throughout the gewog and in the gewog-specific breakout groups at the SJI Launch. This is followed in each section below by the most dominant issues raised by villagers in particular villages visited by the research team.

This village-level breakdown seems important, as 'one size will not fit all' as the SJI moves forward with its programs, activities, and outreach in the coming years. A priority issue in one village will not be the same as a priority in another village. The main purpose of the following breakdown, therefore, is simply to illustrate these different priorities, and the care that must be taken to acknowledge and address different issues of key concern to different groups of villagers, while at the same time remaining cognizant of wider common issues of concern.

At the same time, it must be noted that the following issue list is by no means definitive and is based only on preliminary findings from this initial research venture. There is no doubt that, as the Samdrup Jongkhar Initiative evolves over time and as on-going research provides a continuous evidence base for forward movement, these issues will be greatly modified, with increasing precision over time to enable targeted interventions that address actual needs and opportunities in particular areas.

One final caveat is needed here. The purpose of the following lists is simply to illustrate both the widespread commonality of certain issues, such as human-wildlife conflict, which were frequently mentioned, and the very particular issues and opportunities affecting certain areas, like the presence of specific craft skills in particular villages like Richanglu, or challenges like typhoid resulting from lack of clean water in some parts of Martshala Gewog or malaria in Lauri Gewog. The following does not attempt to provide any detail on these issues and opportunities, for which the descriptions in the main report should be referenced.

MARTSHALA GEWOG:

Human-wildlife conflict
Food storage
Processing machines
Value-added products
Water shortage
Lack of roads/markets
Land fragmentation/landless people
Pests and disease: orange drop
Pollution and climate change
Typhoid
School: too expensive
Access to agricultural machinery

Gorthungma & Theezor:
Human-wildlife conflict—40% losses. Wild boar is main problem
Storage: maize
Lack of clean water: typhoid
Poor soil fertility, erosion
Climate change: stronger sun; heavier, unpredictable rain
Rural-urban migration and drop-outs

Richanglu:
Human-wildlife conflict: 30% losses to wild boar, elephants, monkeys [mostly maize]
No road [government will be building one soon]
Storage: maize, potatoes
Crafts: blacksmiths, carpenters

DEWATHANG GEWOG:
Basic vocational training needs in area
Primary/secondary school improvements have been made

Dewathang [Town]:
Lack of mechanical farming equipment
Lack of water for irrigation
Water disruption [often caused by Dantak road-widening project damaging water pipes]
Human—wildlife conflict
New job potential: weaving and tailoring, tourism
Lack of labour for farmers
Diseases and pests: oranges

Samdrupgatshel:
Water disruption [Dantak project]
Human-wildlife conflict: elephants, boars
Lack of irrigation water
Rural-urban migration
Potential jobs: crafts for export
Pests and disease in crops: cardamom, oranges

Kopor & Bangtsho:
Human-wildlife conflict: elephants, wild boar, deer
Rural-urban migration
Lack of water
Potential for weaving/crafting centre
Water disruption [Dantak project]
Pest problems: oranges
Storage: maize

Martang:

Human-wildlife conflict: wild boar, deer, monkeys, porcupine
Soil fertility
Farming on sloped land
No road

Rikhey:
Irrigation
Storage: maize
Human-wildlife conflict: elephants, boars, deer
Distance to schools: 2+ hours
Potential value-added products, particularly from harvesting non-wood forest products (NWFP)
Competition with India

Rishore:
Water—downstream source and no pump
Human-wildlife conflict: elephants, boar, deer
Schools far away
Soil infertility
Crop pests
Rural-urban migration

Chennari & Khorpan:
Poor soil fertility and erosion
Water disruption [Dantak project]
Human-wildlife conflict: elephants, boars
Rural—urban migration

Domphu, Kheri, Dungkharcholing:
Irrigation
Potential value-added products: oil, popcorn, kharang
Human-wildlife conflict: elephants, boars, monkeys
Crop diseases and pests
Maize spoilage
Potential new jobs: weaving centre, paper factory, furniture making
Schools too far: 1+ hour walk

PEMATHANG GEWOG:
Food storage
Human-wildlife conflict
Insufficient land

Shilingay:
Irrigation
Human-wildlife conflict: boars, elephants, deer, bear
Insect and disease

Nainital:
Human-wildlife conflict: monkeys, deer, wild boar
Soil erosion
Irrigation
Pests and diseases

Kharbandy:
Irrigation and lack of water
Human-wildlife conflict: wild boars, monkeys
Soil erosion/landslides

PHUNTSOTHANG GEWOG:
Insufficient Land
Human-wildlife conflict [60% losses]
Irrigation
Rural-urban migration

Bhangtar Area: [Katathang, Sanshingzol, Belamsherang, Khemetang Villages]
Human-wildlife conflict: wild boar, monkeys
Storage: maize
Value-added products: dairy, fisheries, NWFP, chickens
Soil infertility
Irrigation: destroyed in flood
Need support for small projects like cooperatives

Tsangchuthama:
Scarcity of land
Lack of agricultural machinery: plow, tiller
Irrigation
Pests and disease: paddy
Village near river, floods in monsoon

Thangchugoenpa:
Irrigation
Agricultural pests: rice maize, barley, ginger
Human-wildlife conflict: wild boars, elephants, monkeys, porcupine [30% losses]

Bawani:
Insufficient land/renting
Human-wildlife conflict: wild boar, [50% losses]
Irrigation, lack of water
Lack of roads and bridge [unable to cross river in summer season]
Low labour wages: 100nu/day
Storage and spoilage: vegetables
Poverty: 30% landless

Lack of access to market
Lack of access to healthcare: malaria. Basic Health Unit (BHU) is two hours away
Rural-urban migration
Schools far away: dangerous to walk [no bridge], language barrier

LAURI GEWOG:

Lack of electricity [some solar available but no maintentance]
Lack of roads
Health and sanitation
Market inaccessibility
Human-wildlife conflict: boars, monkeys [villagers abandon land far away from houses]
Storage: maize [yagpu-black insect]
No job market for educated children
Health issues: malaria

SERTHI GEWOG:

Human-wildlife conflict: boars, monkeys, bears [70% losses]
No road access/market access
Crop diseases and pests: maize, orange
Poor housing: no electricity, thatched roofs
Schools far away [two hours walk]

LANGCHENPHU GEWOG:

Human-wildlife conflict: elephants, deer, wild boars, porcupine, monkeys
Unreliable electricity from India
Landless people
Rural-urban migration
Schools too far away [one to two hours walk]; no high school
Access to technology: would like oil press, tiller, milling machine, harvesting machinery
Storage: maize

Daifam:

Water Shortage

ORONG GEWOG:

Orong Village:

Crop pests and diseases: especially orange-related diseases
Storage: maize
Human-wildlife conflict: deer, boars [village has one siren, but it is not effective
In the long term]
Major problem: dropouts and rural-urban migration, resulting in labour shortages
No market for dairy
Water shortage
Potential for weaving/crafting centre, tourism

APPENDIX 5: Background information by gewog

The dzongkhag is administratively supported by two dungkhags. Samdrupcholing Dungkhag is comprised of 4 gewogs: Martshalla, Pemathang, Phuntsothang, and Samrang. Jomotsangkha Dungkhag has 3 gewogs: Lauri, Serthi, and Langchenphu. The rest of the gewogs—Gomdar, Wangphu, Orong, and Dewathang—are directly administrated by the Dzongkhag Administration.

Source: GPIS (Gewog Planning and Information System) submitted by Gewog Administrative Officers
http://www.samdrupjongkhar.gov.bt/
Gewogs are listed alphabetically below, not by region or proximity.

Dewathang

Background
Dewathang town is 18 km away from the Dzongkhag Administration headquarters in Samdrup Jongkhar town, and the gewog consists of 10 main villages with a total population of 11,700. The gewog is bordered by Orong Gewog in the North, Phuntshothang Gewog in the East, Pemagatshel Dzongkhag in the West, and Assam in the South.

Dewathang Gewog consists of mainly dry land. The gewog has potential in horticultural development. Maize is the staple food of the gewog and it is widely cultivated in Kamzhing. Orange is the main cash crop, which significantly contributes to the economic development of the gewog, followed by ginger cultivation.

Statistics:
Estimated Area- 179.03 sq.km
No. of villages- 10
No. of households- 397

Facilities:
Agriculture extension centre- 1
Irrigation channel- 5 kms (Wangchuk channel)
Hospital- 2
ORC- 2
Bridges- 3
No. of households with telephone connection- 200
No. of households with RWSS- 302
No. of villages electrified- 9
No. of households with electricity connectivity- 357

Education:

Community primary school (CPS)- 1
Lower secondary school (LSS)- 1
Middle secondary school (MSS)- 2
Primary school (PS)- 2
Private School- 1
Institution (Jigme Namgyel Polytechnic)- 1
Non formal education centre- 4

Type of Land use:
Dry Land- 901.52 Acres
Wet Land- 77.85 Acres
Pangzhing- 124.76 Acres
Open Grazing land- 121.00 Acres
Developed pastures- 135.00 Acres
Orange orchards- 197.76 Acres

Distance of Dewathang town from Dzongkhag Headquarters:
18 kms (S/Jongkhar - Trashigang highway)

Gomdar

Background
Gomdar Gewog comprises a large number of villages and was recently bifurcated into two gewogs viz. Gomdar and Wangphu Gewogs. After the division, Gomdar Gewog presently has 20 villages with 554 households comprising a population of 5,089.

Gomdar Gewog consists of mainly dry land. Maize is the staple food of the gewog and it is widely cultivated in Kamzhing. Oranges are the main cash crop, and the gewog has potential to produce more oranges to increase income.

Statistics:
Area- 122.24 Sq.Km
Chiwogs- 16
Villages- 20
Households- 554

Facilities:
Agriculture Extension centre- 1
Irrigation channel- 1.53 kms
Farm Road- 11.35 kms (under construction)
Bridges- 2
Basic Health Unit (BHU)- 1
ORC- 3
No. of households with telephone connection- 25
No. of households with RWSS- 511

Education:
CPS-1
LSS-1
Non formal education centres- 3

Distance from Dzongkhag Headquarters:
70 kms, including 11.35 kms of farm road from Narphung (under construction)

Langchenphu

Background
The gewog centre is based at Jomotsangkha Dungkhag, bordering on the Indian states of Assam and Arunachal Pradesh. Though the gewog is accessible by motor road, passability is conditional, since the road passes through the Indian state of Assam, where strikes have been frequent. The gewog has 15 villages with total of 252 households.

Langchenphu Gewog consists of mainly wetland. The soil types are mainly sandy and clayey loam and have potential for increased agricultural development. Paddy is the staple food crop of the gewog.

Statistics:
Estimated Area- 224.4 sq.km
Villages- 15
Households- 252

Facilities:
Agriculture Extension center- 1
Irrigation Channel- 16.5 kms
Farm Road (Jomotsangkha to Gelongkhar)- 9.1 Kms
Forest Road (Jomotsangkha to Golanti-Khowrong)- 10 Kms
Forest Road (Jomotsangkha to upper Langchenphu)- 1.50 km
Suspension Bridge (Daifamkhola zam)- 1
BHU- 1
ORC- 2
Post Office- 1
PCO- 1
No. of households with telephone connection (Multi-Voip Systems)- 58
No. of households with RWSS- 218
No. of households with electricity connectivity- 248
No. of villages electrified- 5

Education:
LSS- 1
Non formal education centres- 2

Distance from Dzongkhag Headquarters:
190 kms – Through India via Rangia and Rowta, Assam (4 hours drive)

Lauri

Background
Lauri Gewog is the most far-flung gewog in the dzongkhag, officially three days walk away from the Jomotsangkha Dungkhag. It is accessible only by mule tracks and footpath. The gewog is bordered by the Indian state of Arunachal Pradesh. Lauri Gewog has 15 villages with a total of 540 households.

Lauri Gewog consists of mainly dry land, growing maize as the main staple food crop of the gewog and it is widely cultivated in Kamzhing and Pangzhingi. Other crops like paddy, upland paddy, millet, mustard, legumes, buckwheat, and potato are grown in this gewog at smaller scales.

Statistics:
Estimated area- 271.71 sq.km
Chiwogs- 13
Villages- 15
Households- 540

Facilities:
Renewable Natural Resources (RNR) Centre- 1
Irrigation Channel- 19 kms
Bridges- 5
BHU- 1
ORC- 3
No. of households with telephone connection- 1 (satellite phone)
No. of households with RWSS- 501

Education:
CPS-3
Non-formal education centres- 3

Type of Land use (area in acres)
Dry land- 1784.62
Wet land- 38.24
Pangzhing- 77.29
Open grazing land- 15
Apple Orchard- 0.56
Cardamom- 0.60
Sogshing- 117.84

Martshalla

Martshalla Gewog is three and half hours walk from the road point at Tshangchutham. The gewog has 28 villages with 545 households. The total area of the gewog is 345.3 square kilometres and is bordered by Kangpara Gewog of Trashigang Dzongkhag in the north, Wangphu Gewog in the west, Serthi Gewog in the east, and Phuntshothang Gewog in the south. The gewog has a subtropical climate with altitude ranging from 280 to 2,500 meters above sea level. Since the gewog falls within the Chirapunji Mountain Range, it gets heavy rainfall.

Martshalla Gewog consists of mainly dry land. Maize is cultivated as the staple food crop in the gewog in Kamzhing and Pangshing/Tseri. Other crops like paddy, millet, mustard, legumes, and buckwheat are grown in this gewog on a small scale.

Orong

Orong Gewog has 27 villages with a total of 468 households comprising of 4,626 people. Orong Gewog consists of mainly dry land. Maize is cultivated as the staple food crop in the gewog. In the lower part of the gewog, double cropping of maize is usually practiced. The other crops like paddy, millet, mustard, legumes, buckwheat, beans, and ginger are grown in this gewog on a small scale.

Statistics:
Estimated Area- 179.03 sq.km
Chiwogs- 18
Villages- 27
Households- 468

Facilities:
RNR Centre- 1
Irrigation Channel- 10.61 kms.
Farm Road- 12.26Kms (Shekpashing to Orong)
Farm Road- 16 Km (Orong to Wooling)
Bridges- 4 (1 under construction)
BHU- 1
ORC- 3
No. of villages with telephone connection- 15
No. of households with telephone connection- 418
No. of households with RWSS- 418
No. of villages electrified- 5
No. of households electrified- 391

Education:
CPS- 1
LSS- 1

MSS- 1
Higher secondary school (HSS)- 1
Non formal education centres- 3

Population:
Male- 2,353
Female- 2,273
Total- 4,626

Types of land use
Chimsa- 44.6 Acres
Dry Land- 1,843.89 Acres
Wet Land- 66.05 Acres
Pangzhing- 549.57 Acres
Orange Orchard- 33.85 Acres

Distance from Dzongkhag Headquarters:
62.5 kms (including 12.26 kms of farm road from Shepashing)

Pemathang

Background
Pemathang Gewog is located at altitudes from 600 to 1200 metres above sea level. It is a hanging plateau of southern foothills and it drops down to the Assam Plain. The gewog has a total area of 66.10 square kilometres and is bordered by Phuntshothang Gewog in the west, Samrang Gewog in the east, Martshalla Gewog in the north and the Indian state of Assam in the south.

The gewog experiences a subtropical climate and heavy monsoon rains from June to September. Pemathang Gewog is one of the gewogs of Samdrupcholing Dungkhag. The gewog has 15 villages and 296 households. Pemathang Gewog has 10 chiwogs.

Pemathang Gewog consists of mainly wetland in terms of land use patterns. The soil types are mainly sandy and clay loam and are suitable for agricultural development. Paddy is the staple food of the gewog and it is widely cultivated in 657.28 acres of wetland. The local scented variety of rice known as Khamtey is also grown in this gewog. The lower part of the gewog has potential for double cropping of paddy and maize.

Statistics:
Estimated Area- 66.10 sq.km
Villages- 15
Chiwogs- 10
Households- 296

Facilities:
Irrigation Channel- 10.97 kms
ORC- 1
Farm Road- 5 kms
No. of villages with telephone connection- 5
No. of households with telephone connection- 15
No. of households covered by with RWSS- 254
No. of villages electrified- 3
No. of households electrified- 254

Education:
LSS-1
Non formal education centres- 3

Population:
Male- 1,274
Female- 1,241
Total- 2,515

Type of land use
Dry Land- 477.99 acres
Wet Land- 657.28 acres
Pangzhing- 3,404 acres
Tshesa- 48.26 acres
Orange orchard- 6.15 acres

Distance from Dzongkhag Headquarters:
75 kms, including 5 kms of farm road from Phuntshothang

Phuntshothang

Background
Phuntshothang Gewog is administratively under the Samdrupcholing Dungkhag. The gewog consists of 28 villages comprising 520 households. The gewog has an area of about 137.2 square kilometres and the landscape is largely a plain, where crops like maize and millet are grown quite extensively. Road connections planned from various directions in the near future will provide easy access to markets.

With the availability of a vast area available for cultivation and development, the gewog has a proposal for town planning. With the successful establishment of this town, it is anticipated that the gewog will able to sell its agricultural surplus products to the market.

Phuntshothang Gewog consists mainly of wetland. Paddy is cultivated as staple food crop in the gewog and it is widely cultivated on 766 acres of wetland. Maize and millet are

also grown extensively in the gewog. The gewog has potential for double cropping of paddy and maize.

Statistics:
Area- 137.2 sq.km
Chiwogs- 11
Villages- 28
Households- 520

Facilities:
RNR Centre- 1
Irrigation Channel- 11.66 kms
Bridges- 2
BHU- 1
ORC- 3
No. of households with telephone connection- 63
No. of households with RWSS- 536
No. of households with electricity connectivity- 472

Education:
MSS-1
Non formal education centre- 2

Population:
Male- 1,402
Female- 1,349
Total- 2,751

Type of land use
Dry Land- 744.99 acres
Wet Land- 657.28 acres
Pangzhing- 3,404 acres
Tshesa- 48.26 acres
Orange orchard- 6.15 acres

Distance from Dzongkhag Headquarters:
68 kms- Dzongkhag road

Samrang

Samrang is the smallest gewog in the dzongkhag in terms of population, and it is administratively under Pemathang Gewog. Hence the 9th Five-Year Plan was with Pemathang Gewog. The gewog has 18 households and it remains remote due to lack of road connectivity. Samrang Gewog consists mainly of dry land. It has potential for

agricultural and horticultural development. Both rice and maize are the staple food crops of the gewog.

Serthi

Background:
Serthi Gewog is under Jomotsangkha Dungkhag and it is bordered by Lauri Gewog in the north, Langchenphu Gewog in the south, Martshalla Gewog in the west and the Indian state of Arunachal Pradesh in the sast. The gewog has 13 villages with 333 households. Serthi Gewog covers an area of about 303 square kilometres.

The gewog experiences a subtropical climate and altitude ranges from 600 to 2200 metres above sea level. Since the gewog is within the Chirapunji Mountain Range, it receives a heavy rainfall starting from June till the end of August. The average temperature is 30 degrees Celsius in the summer and 10 degrees Celsius in the winter.

Serthi Gewog consists mainly of dry land in terms of land use patterns. Maize is the staple food of the gewog and it is widely cultivated in Kamzhing and Tseri.

Statistics:
Area- 303 sq.km
Chiwogs- 10
Village- 13
Households- 333

Facilities:
RNR centre- 1
Farm road- 3.7 kms (under construction)
Bridge- 1
BHU- 1
ORC- 2
No. of households with telephone connection- 1 (Satellite)
No. of households with RWSS- 225

Education:
CPS- 2
LSS- 1
Non formal education centre- 1

Population:
Male- 1,045
Female- 959
Total- 2,803

Type of land use (area in acres)

Dry Land- 587.07
Wet Land- 31.79
Pangzhing- 50.90
Open grazing land- 29.65
Developed pastures- 221.01

Distance from Dzongkhag Headquarters:
202.8 kms, ncluding 12.8 kms farm road from Gelongkhar (under construction)

Wangphu

Background
The gewog was recently bifurcated from Gomdar as per the 85th National Assembly Resolution, and now stands as an individual gewog. The gewog is bordered by Gomdar Gewog in the north, by Martshalla Gewog in the east, and by Orong Gewog in the south.

The gewog consists mainly of dry land. Maize is widely cultivated as a staple food crop in the gewog in Kamzhing. Oranges are the main cash crop of the gewog, and the gewog has potential to produce more oranges to generate additional income.

Statistics:
Area- 60 sq.km
Chiwogs- 15
Village- 13
Households- 361

Facilities:
RNR centre- 1
Irrigation channel- 6.41 kms
Bridge- 1
BHU- 1
ORC- 1
No. of households with telephone connection-
No. of households with RWSS- 321

Education:
CPS- 2
Non formal education centres- 2

Population:
Male- 1,358
Female- 1,299
Total- 2,657

Type of land use (area in acres)

Chimsa-11.95
Dry land- 741.82
Wet Land- 7.30
Pangzhing- 144.7
Tseri- 4.39 (only one household)
Tshesa- 0.02 (only one household)
Open grazing land- 542.28
Orchard- 59.24

Distance from Dzongkhag Headquarters:
70 kms, including 11.35 kms of farm road from Narphung (under construction) plus 4 hours walk from Gomdar to Wangphu Gewog.

APPENDIX 6: Organic Farming Association of India — Report of visit to Samdrup Jongkhar (unedited, as received)

Please note that the following report received from the Organic Farming Association of India has not been edited for grammar or typographical errors.

A report on OFAI and Samdrup Jongkhar Initiative [SJI] organic farming, PGS, and farmer cooperative workshops, Feb 17–28, 2011

By
OFAI Members:
Miguel Braganza, Goa
Ashish Gupta, New Delhi
and Vikram Rawat, Himachal Pradesh.
Submitted to
Organic Farming Association of India and Executive Director, SJI camp at Dewathang, Bhutan

Definitions

- Panchgavya – A plant growth enhancing and pest repellent compound made from 5 elements from the cow viz. Dung, Urine, Milk, Buttermilk and Ghee (Clarified Butter)
- GNH – Gross National Happiness – the underlying *prana-mantra* proposed by the King of Bhutan as more important than GDP and a way of life in Bhutan.
- Citrus greening – Citrus Dieback or HLB disease is a wide serious disease which affects citrus trees.
- NTFP – Non Timber Forest Produce such as Chirata, wild herbs and berries etc.
- Sanjeevak – An easy to make plant potentate and pest repellent. Though not as superior as Panchgavya but a quick solution to use with crops.
- CPP – Cow Pat Pit is a biodynamic method of making effective manure with Cow Dung. CPP has multiple uses and is very effective in Organic Farming Applications.
- PGS – Participatory Guarantee System is a farmer friendly mechanism of peer certification of Organic Produce. It is an internationally applicable organic quality assurance system [like ISO 9000] implemented and controlled by the committed organic farmer-producers through active participation, along with the consumers, in the process based on verifiable trust.

Executive Summary

The Samdrup Jongkhar Initiative [SJI] was launched in December, 2010, by the Prime Minister of Bhutan, Mr. Jigme Y. Thinley, in the presence of the District Governor and Ms. Kesang Tshomo, Coordinator of National Organic Program [NOP] of Bhutan. On 25 February 2011, the PM met the SJI and OFAI members and reviewed the sustained activities of SJI. He complimented it for the unflagging enthusiasm in activities to promote GNH through organic agriculture and collective marketing. The PM's statement during the Five Year Plan at Samdrup Jongkhar town on 26 February 2011, had specific references to organic agriculture.

The Organic Farming Association of India [OFAI] was invited by SJI to conduct a series of lecture-demonstrations and Q & A sessions from 18 to 27 February 2011 to help promote Organic Agriculture, PGS and sensitize farmers on the benefits of running autonomous farmer cooperatives as a means to achieve the Bhutanese national goal of GNH. The approach was to enhance the utilization of the Ministry of Agriculture & Forests [MoAF] and NOP schemes through effective communication of available information and capacity building among the farmers through day-long workshops with emphasis on method demonstrations and trouble-shooting by Q & A sessions facilitated through local leadership. The demonstrations were conducted with the help of posters of MoAF/RNR Extension 'brochures'. These brochures contained valuable information of Organic farming techniques and were extensively used in the village workshops by the SJI/OFAI T.E.A.M (an abbreviation for 'Together Everyone Achieves More').

The farmers in most villages of Samdrup Jongkhar Dzongkhag were organic by tradition and only a few used any synthetic fertilisers like urea or sprayed any pesticides provided by the Bhutan Government agencies. Farmers knew many organic practices, including preparation of 'Panchagavya' used in some religious rituals in Bhutan as in neighbouring India. Dasho Tashi Dorji translated and provided the local context and humour to the lecture-demonstrations by OFAI faculty members and, towards the end of the ten day programme conducted some of the lecture-demonstrations independently in *Orang, Wooling* and *Dewathang* without any need of the OFAI T.E.A.M. members from India. Hence, a local expert had been enabled and empowered to sustain the process of conversion of 'natural farming' solely dependent on the goodness of Mother Nature to 'organic farming' where man assisted Nature to help boost productivity in harmony with natural processes. Mr. Ashok Kumar Pradhan, Extension Supervisor-1, with long experience in Khate Bhangtar/Somdrup and currently posted in Orang village also evinced keen interest in both, the preparations of organic formulations for enhancement of plant growth, reduction of disease infection and insect pest management in oranges and maize as well as the NOP of Bhutan.

Other RNR Extension may be given similar hands-on exposure to organic farming methods and visits to organic farms in India to be convinced that OA is better than the best of industrial agriculture, has sustained high production levels for all crops and at a

fraction of the cost. The Low External Input Sustainable Agriculture [LEISA] 'organic' produce with credible local label such as 'PGS Organic' can actually be marketed at prices lower than those of industrial agriculture.The workshops culminated with a meeting with H.E. Prime Minister of Bhutan Mr. Jigme Thinley. A summary report of the meeting is attached as Annexure 0 below to this report. In addition various Organic Farming techniques such as Panchgavya, CPP and Sanjeevak as discussed with the farmers are detailed in Annexure 0 below.

Introduction

The Kingdom of Bhutan is nestled in the lap of the Himalaya Mountains or *Kailash Parvat* associated with the heavenly pair, Shiva-Parvati, the destroyers of evil. It has been ruled by the *Wangchuk* dynasty for a little over a century and has recently created history for two reasons: coronation of a young king after his father abdicated the throne and set in process to establish participatory governance through democratic elections. PGS, which finds mention in the MoAF publications and is in tune with Bhutan's guidelines for organic farming, can help take this democratization and empowering process to the villages in harmony with the principles of Ahimsa and GNH.

The geographical area of Bhutan is 38,394 sq. Km [ten times that of the Indian state of Goa, 3710 sq. Km.] and its population is about 7,00,000 persons [6,34,984 persons in May, 2005, or half the population of Goa]. A whopping 72% of the land is under forests; 10% under meadows, pastures, tseri shifting cultivation or barren; 10% under snows and glaciers while 8% is under agriculture and habitation. Of the 65,000 farming households, about 56% own 1 to 5 acres [0.4 to 2 hectares] of land.

Samdrup Jongkhar Dzongkhag is the Eastern district that borders Assam. The elevations are from Mean Sea Level [MSL] at Darranga, Somdrup Jongkhar town and Khame Bhangtar/Somdrup to about 1000 metres above MSL at Dewathang town, Orong and Wooling villages.

The farmers in most villages of Samdrup Jongkhar Dzongkhag are organic by tradition and only a few used any synthetic fertilisers like urea or sprayed any pesticides provided by the Bhutan Government agencies. Farmers knew many organic practices.

The SJI workshops have set its wheels in motion in December 2010, with a flag off by the Prime Minister of Bhutan in the presence of the Coordinator of the NOP-Bhutan, Ms. Kesang Tshomo. The OFAI T.E.A.M. [Together Everyone Achieves More] of Ashish Gupta from Delhi, Vikram Singh Rawat from Himachal Pradesh and Miguel Braganza from Goa joined the SJI for ten days [18 to 27 February 2011] to help in constructing Organic Agriculture, PGS and formation of farmers cooperatives as a means of collective marketing as the two-lane highway in the roadmap to reach the Bhutanese national destination of GNH through respect of all living creatures, big and small.

The main objective of SJI is to make the people of Samdrup Jongkhar Dzongkhag, the Eastern-most District of Bhutan bordering Assam, self-sufficient in food at home and in every village while ensuring the health of all: soil, environment and every living creature through organic agriculture, value addition and collective marketing at local, district and national level through the farmer-led PGS.
The following sections contain details of the visit including the timeline briefs as well as a detailed overview of the workshops and experiences. A section follows this on conclusions, which contain the learning and recommendations resulting from this visit.

Volunteers from OFAI

A Three member team from OFAI was invited over by SJI to conduct workshops with assistance from SJI towards assisting farmers of the region in Organic Agriculture techniques, PGS certification mechanism and advantages of marketing through a village Cooperative model. The three members are -

- Miguel Braganza, Goa , India
- Ashish Gupta, New Delhi, India.
- Vikram Rawat, Himachal Pradesh, India

Facilitator and Interpreters

Members of SJI assisted the volunteers in hosting the stay and workshops at various villages. The members also provided necessary translations, debriefing and assistance with the demonstrations held at various villages. The SJI members were:

- Ronald 'Tashi' Colman
- Dasho Tashi Dorji
- Cheku Dorji
- Dema

Dasho Tashi Dorji accompanied the volunteers to all the villages where the workshops were conducted. His assistants Cheku and Dema managed the logistical arrangements. Tashi Colman provided overall direction to the entire event.

Beneficiaries

The interaction with various villagers took place in mainly 5 villages of the Samdrup Jongkhar Dzongkhag. The villages are –

- Khappe Samdrup [Lower Bhangtar]
- Khamme Samdrup [Upper Bhangtar]
- Orong
- Wooling
- Dewathang

The approximate number of farmers who participated in the workshops was -

Male: 260
Female: 280

In addition, the volunteers and SJI members also held meetings with Vendors, vegetable sellers and general public and administration of Dewathang. In addition we met with His Excellency Prime Minister of Bhutan Mr. Jigme Thinley and some of his ministers. It is our belief that the impact of these discussions should lead to sensitization of Organic Agriculture, PGS and Cooperatives on a 10 fold basis. The total number of people who will now be in the know of SJI and associated work on Organic Farming, PGS and Farmer Cooperatives should be at least 3000.

Schedule of Events

The events timeline is described as the following subsections. However a specific overview of the entire visit follows in Section 0 below.

17 February 2011
Team members from OFAI arrive at Dewathang via Guwahati, Darranga and Samdrup Jongkhar. Cheku arranges a late meeting with the immigration office to facilitate the permits required for the visit to the Samdrup Jongkhar Dzongkhag.

18 February 2011
An inauguration meeting is held at the Jigme Namgyal Polytechnic [JPC]. The meeting starts a workshop series with farmers from the three Eastern Geogs [Lourie, etc]. The session was a semi-formal series of discussions with the farmers. A basic dialogue on introduction to Organic Agriculture and practices such as Panchagavya, Biodynamic Cow Pat Pit, collective marketing through farmer's cooperatives and PGS as a mechanism for certifying produce for the end consumers was held. This followed a Q & A session where farmers highlight their problems in marketing produce like Oranges, which are exported to Bangladesh and *Chirata* [Swertia chirata]. Specifically regarding Chirata, the farmers claim that though large quantities of Forest yield Chirata is sent to places as far as Delhi in India. They were unsure of its exact use at the destination as well as the fact that the middlemen do not allow them to receive complete financial benefits of the produce.

The after noon session was held with potential buyers of OA produce. The primary consumers of vegetable and milk in the geog are the JNP hostel, Army base camp, Army Hospital, *Chedra* [Buddhist Monastery of higher studies] and various vegetable vendors from Dewathang town. The discussion leads to the understanding of the following –

- All organizations travel across the border to India to purchase all food essentials. The main reason for this is lack of availability in the region, the price of any produce and the quality.

- None of the institutions consumes fresh milk despite of the presence of a functional Milk Cooperative at Dewathang. All institutions rely on powder milk made available from Indian markets.
- The institutions do not consume local farm cheese produced and instead manufactured cheese from India such as Amul or Britannia is used.
- All institutions have a relatively high demand for fresh vegetables e.g. cumulative demand for potatoes goes over 500kg. Whereas potatoes are not bought locally but across the border.
- All institutions agree that if local produce is made available on a regular basis, fresh and an affordable price they will choose to buy local.

19 February 2011
A meeting is held at the dzongkhag [district] administration office. The meeting is presided by the OFAI team, SJI members and resource people, District Extension Officer [DEO] and RNR Extension Agents of MoAF in SJ Dzongkhag, Hotel & Restaurant owners, wholesale/retail vegetable vendors. The purpose of the meeting is to assess awareness of 'organic' produce and possible marketing of produce by SJI-enabled organic farmers' collectives/PGS 'Local Groups' in SJ Dzongkhag/District.

20 February 2011
A workshop is held at the Khame Samdrup [Lower Bangtar] village which is at an elevation of 150MSL. The meeting included lectures/presentation, posters, live specimens, method demonstrations and Q & A session. A demonstration CPP pit was made by members of OFAI. Attending farmers were intent on learning more on how to make good quality compost from cow dung. It was observed that the village had a cultivation diversity of Rice, Areca, Banana and Pepper. Miguel noted that the road lining had *Glyricidia Sepium* fencing, *Calotropis gigantea*, *Eupatorium spp*, *Lantana camara* plants available. Farmers were familiar with preparation of *Panchagavya* and its cleansing properties and also used it for rituals. The day ended with a presentation of folk dance/ballad and *Bumchang* [maize brew] by village group.

21 February 2011
A debriefing review meeting was held and analysis of information obtained for planning the 'Way Forward' during the subsequent village level trainings. Discussions were held in learning of the workshop and meeting held in the past 2 days. OFAI members learnt about demographics of the region and cultural sensitivities, which must be kept in mind while making further presentations. OFAI members tuned the modus in which further training was to be held.

22 February 2011
A farmer's workshop was held at Khatte Samdrup [Upper Bangtar], which is at an elevation of 650 MSL. Lectures/presentation, posters, plant specimens, method demonstrations and Q & A sessions were held at the village. It was observed the crop diversity at this village was Maize, Areca, Banana and Pepper cultivation. Weeds such as *Eupatorium spp* are over-running the roadside all the way to the village and *Lantana*

camara plants available. The farm on which the meeting was held had a wonderful mix of Multi-level cropping done. Coffee plants were also grown, but no processing knowledge existed with the villagers hence it was an unutilised crop. Farmers are familiar with *Panchagavya* preparation and its cleansing properties. CPP pit demonstration was held in which the farmers also participated and had keen questions to ask about making and obtaining the Prep kits.

23 February 2011
A training session was arranged at the Orong village. An RNR Extension Supervisor also attended and provided valuable inputs in the meeting. The village has a mix of Oranges and Maize is the major crops. Vegetables are grown for home consumption as well as marketed by a 22 members Farmers Vegetable Marketing Group. Hence the village had a functioning cooperative of farmers who collectively marketed milk and vegetables. The village or Orong could be a possible quick starter for a PGS groups and conjunct with Dewathang to form a larger cooperative to increase volume of produce for market. CPP demonstration was held at the village and farmers were advised on its various uses.

24 February 2011
A training session was held at the Wooling village. Here too, oranges and maize are the major crops and vegetables grown for home consumption. Farmers are familiar with use of maize straw and wooden pegs across the slope to prevent soil erosion and to gradually produce contour terraces. The farmers of this village seemed satisfied with their harvest of crops. In addition the villagers also made a living weaving belts, shawls and other silk and cotton patterns. Here too, CPP demonstration was completed with active participation from the farmers.

25 February 2011
Final training session was held near Dewathang town. The town has farmers who grow mainly oranges and maize. Vegetables are grown in kitchen gardens for home consumption. Farmers are familiar with use of composting and terracing across the slope to prevent soil erosion and to produce contour terraces. A clarification on the composting process demonstrated by the Navdanya team of Mr. Vinod Bhat and Mr. Darbaan Singh Negi was sought where the farmer described his experience in managing the pit compost. One elderly farmer, Mr. Sherup, had actually tried the composting in three pits but had to harvest two pits early for the crop due to shortage of cow dung. One pit has been retained for full compost run of 180 days. While farmers agreed that vermicomposting was a labour saving device they all mentioned that worms were not available.

25 February 2011
Interaction of SJI and OFAI members with the H.E Prime Minister of Bhutan, Mr. Jigme Y. Thinley, Finance Minister, Mr. Wangdi Norbu; Health Minister, Mr. Zonglay Drogba; Secretary for Agriculture, Mr. Sherup Dorji, and the Protocol Officer. Details of the meeting are in the Annexure 0 below.

26 February 2011

OFAI team visited the orange plantation of Mr. Sonam Gyeltshen at Dewathang in Army restricted area. It was by far one of the best maintained orange orchards in the area with traditional practices maintained. The plantation had 2000 trees at uniform 6 M x 6 M spacing in rows. Triennial pruning on the trees was done with sloping cut, which avoids water logging and related pest problems. Some observations made were that bench basins at base of the tree need to be made for soil, water and nutrient conservation. This was discussed with Mr. Gyeltshen.

27 February 2011
The OFAI team took a half day for a casual trek down to the river at the valley below Dewathang town with GPI Atlantic Statistical Researcher Ms. Linda Pannozzo, Appropriate Technology Consultant Luke Raftis and Zero-Waste Consultant Katherine Morales. Coincidentally it was observed that one large Orange grower en-route had adopted the basin making practice explained by the OFAI T.E.A.M. to growers in Dewathang on 18 February and reinforced on 25 February 2011. It was really heartening to see such quick response.

28 February 2011
OFAI team leaves for Samdrup Jongkhar town en route to Guwahati.

Specific Overview

This section contains observations and analysis made by the OFAI team during their visits to farms and meeting with various stakeholders in the SJI initiative. Though not in any particular order they reflect the myriad views which may help in understanding the challenges to be addressed by the people of Samdrup Jongkhar in adopting the practices of Organic farming and developing their own potential solutions towards establishing a self reliant and sustainable market with GNH at its heart.

Meeting with farmers from distant Geogs

On the 18 of February 2011, SJI began a ten day programme of linking organic farmers to potential buyers, both institutional and individual, as well as for upgrading of farming and marketing skills through collective action. The core competence of the Resource persons was in cultivation of fruits and vegetables organically in high altitudes, collection and marketing of the organic fruits and vegetables as well as capacity building and networking of farmer groups. A meeting scheduled with the farmers from the three Geogs including Lauri Geog, resulted in a day-long sensitization and Q & A programme at the JNP, Dewathang. In the morning session farmers from the three far-flung Eastern-most Geogs of Lauri, Serthi and Langchenphu districts and some farmers from other Geogs were introduced to the OFAI network of Organic Farmers' Organizations [OFOs] across India and the IFOAM definition of Organic Agriculture as '***a production system that sustains the health of soils, ecosystems and people, combining tradition, innovation***

and science, and promotes fair relationships and a good quality of life for all involved' to development of assured markets using PGS and FairTrade.

The participating farmers were made conscious of the fact that their loyalty to the organic traditions has placed them at an advantage when the people who were seduced by the 'Green Revolution' technology of chemical-based farming and strayed away in the rest world were turning back to sustainable farming and organic produce. There was a need to adapt innovative uses of traditional formulations like '**Panchagavya**', '**Sanjivak**' and **CPP** that were now adapted for soil improvement and better plant growth. They are superior even to **Effective Microorganisms** or EM, which was laboratory produced and lacked the plant growth promoting substances that cow urine provided in the traditional formulations. There is a mention of some of them in '**A Guide to Organic Agriculture in Bhutan',** published in 2007 by NOP.

It was noted that a number of attendees were from far-flung villages which required them to walk for almost 2 days before being accessible by road to Dewathang. This indicated the lack of infrastructure in the region the farmers have to endure. In addition the farmers indicated that from their region Chirata and Oranges were exported to India and Bangladesh; however they had no say in how these are sold to the end consumers. This indicated their desire to learn more about where there produce is used and how they can also learn about its potential benefits e.g. farmers were not clear how *Chirata*, which is shipped in large quantities to Delhi, is actually used.

However, the most commonly expressed problem was the absence of roads and transport to market the oranges produced in the Eastern three Geogs. In addition the marketing costs of the produce for individual farmers were greater than the sale value. There were neither collective marketing systems nor any value addition processes known to them. Local demand for fresh fruits was low.

Another problem faced by the farmers was that of damaged crops by wild animals such as pigs, elephants and deer. Wild animals, protected by law, browsed on and damaged crops in areas near forests, including 'slash-and-burn cultivation' or Tseri. Farmers of some region such as Khame Bangtar had devised methods of using bamboo fences to protect their crops however measures were unsuccessful.

Panchgavya as Tradition with the Farmers

Panchagavya preparation was known to the people in Khame and Khate Bhangtar/Somdrup villages as well as Dewathang town in East Bhutan. However, its application to soil, plants and farm animals was an innovation that had not yet reached the people although there is RNR Extension brochure of the Dept. of Agriculture. MoAF, Thimphu, specifically on the agricultural applications of *Panchagavya*. They were also unaware of the validation of *Panchagavya* contents and applications done by scientists in the laboratories and fields of microbiology, biotechnology, crop physiology, agronomy, animal sciences and human medicine. The Resource Persons shared their experiences in

India that would be useful in the local context of Samdrup Jongkhar district of Bhutan bordering Assam, India.

Milch cattle are available in every village of Samdrup Jongkhar Dzongkhag now and there is a tradition of making butter. Milk curdles naturally and so all the ingredients for these preparations/formulations are available in every village. So cow dung [***Wa Kee***], cow's urine [***Wa Chirang***], milk, curds and cow's milk butter, the five constituent ingredients of Panchagavya, are locally available. Sugarcane and bananas are locally cultivated and so sugarcane juice, jaggery [***Burum***] and ripe bananas are also available. In some villages like Khate Bangtar/Samdrup, coconuts are also grown and so coconut water is available as an additive to Panchagavya. Cow's urine also contained the plant growth promoting substances as well as insect repellant properties. The training workshops helped the farmer participants to recollect their experiences and recover from the recesses of their memory what their elders told them before the Green Revolution technology was introduced in Bhutan about 25 years ago.

While farms were observed to have proper cow sheds, there was no good arrangement to collect cow urine. It was suggested that hollow half-bamboo be fixed at slope perimeter as a easy channel for collecting urine in a bucket. This was taken well by farmers of various villages.

Citrus Greening Problem at Orange Orchards

There is a widespread incidence of citrus HLB disease that results in poor fruit bearing, colour inversion during ripening, mottling of the younger leaves, yellowing of branches, slow decline and ultimately death of the plants. Trunk borer incidence can also be seen occurring randomly in almost all orange gardens. Most orange growers do not possess a sprayer and do not know the difference between an insecticide and a fungicide, though the RNR extension agents are reported to have conducted some demonstrations in 2009, insect pests and diseases management were not a priority of the farmers. It may, therefore, be better to directly focus on plant health management to prevent insect infestation and disease infections rather than to deal with curative measures after such incidence. Preparing basins at the base of plants, crescent trenches upslope of the trees for soil and water conservation, use of Panchagavya, Sanjivak and of CPP sprays and use of plant-based insect-repellent extracts may be ideal for Bhutan.

At least two farmers owned 2000 bearing orange trees scientifically planted in rows spaced at 6M x 6M and pruned triennially with oblique cuts with band saw. However, treatment of cut ends was non-existent and hence the prevalence to stem/bark borers as well as incidence of diseases. By the end of the ten day workshops one of the two large farmers in Dewathang had adopted the practice of preparing **basins** around the base of the orange trees on the 25 to 50 percent [22 to 45 degree gradient] hill-slopes for soil, moisture and nutrient conservation advocated by the OFAI T.E.A.M. The Agriculture Secretary, Mr. **Sherup Dorji**, shared the view of the OFAI T.E.A.M. that the Bhutanese oranges needed more attention. Citrus dieback, Greening [**Huanglongbing** or Tristeza] spread by Psyllid vector, bacterial canker and other diseases needed to be attended to.

The National Plant Protection Centre [NPPC] of the Ministry of Agriculture & Forests [MoAF], Government of Bhutan [www.moaf.gov.bt and www.vercon.bt; nppc@druknet.bt] has recognized the importance of HLB and has mandated the RNR Extension agents to carry out annual post-harvest [March- April] and pre-harvest [September-October] surveys for **HLB** symptoms like blotchy, chlorotic leaf mottling and yellowing of branches and for presence of Psyllids. ***Phytophthora*** disease and bark/**trunk borer** incidence are also included in the survey due to a possible association of tree health and HLB infection.

Existing Markets for Oranges

The farmers in the extreme East and parts of Dewathang town [recently designated as 'A' Class town like Samdrup Jongkhar], Orong and Wooling villages grew oranges, most of which are exported to Bangladesh via Assam. The three grades of oranges as per size were **Killi, Milli** and **Tablet**. Killi [about 10cm in diameter] is the biggest size, obtained at the start of the season in November-December, while Tablet [about 5 cm in diameter] dominated the end of season crop in February. The fruits are currently sold by the truck-load and fetch an average price of Rs.0.80 per fruit with a range from Rs.2/ for 'Killi' orange to Rs.0.35 for 'tablet' orange. The traders in Samdrup Jongkhar town did the **sorting, grading and packaging of the oranges** in wooden crates for export. There was hardly any local consumption of the delicious, juicy and sweet 'Local' oranges. No **juices** or **concentrates** of orange are available, whereas synthetic flavoured RTD 'fruit' juices imported from Bangladesh are used extensively.

Weeds Used for Plant Protection

The farmers are also familiar with plants that industrial agriculture terms as 'weeds' but organic agriculture treats as a 'misplaced resource' that can be tapped for preparation of insect repellants. These included *Lantana camara* [*Aputro*], *Parthenium cinererifolia* [*Meringma*], *Eupatorium sp* [*Assamay*] and Flame Nettle [*Baizoo*][3]. They were told how the leaves of these plants can be cut and soaked for ten days in diluted Panchagavya, Sanjivak or even cow's urine, filtered through cloth and the extract diluted ten times in water for spraying on plants as an insect repellant. The concept of the 'kill' that is integral to industrial agriculture, where the Latin word 'cedo[4]s' that is the root of insecticide, herbicide, etc means 'to kill' as in homicide and suicide, is culturally unacceptable to the 'Ahimsa' practicing organic farmers and Buddhists alike.

The village level sensitizing programme was initiated in village Khamekham Bhangtar, which is at a low elevation and grows rice, maize and areca nut, with limited area under chillies and vegetables. There is natural water flow from seepage. There are large plants of *Glyricidia sepium* used as crop fence along the roadside where the mud road begins near the bridge. This tree can be multiplied by stem cuttings at the onset of monsoon and planted at every metre distance. The leaves are a wonderful nitrogen-rich green manure for rice [to be incorporated in the soil at first ploughing of the rice field] and the root

[3] Names in parentheses are local names for the weeds

nodules also fix nitrogen. The leaves repel rodents, specially field rats and mice. The powdered bark, mixed with rice flour or cooked rice, repels rats when they consume it.

The *Calatropis gigantia* plant can also be multiplied by cuttings. Finely chopped leaves and stems of Calatropis can be put in a sack or bamboo basket in the stream of water flowing into the paddy field and it will protect the crop from sucking insects and hoppers. Leaves of the American Smoke Weed, *Eupatorium spp*, and *Lantana camara* with pretty flower clusters can be decomposed in a 20 litre plastic bucket or mud pot with half litre Panchagavya or cow's urine and enough water to immerse the leaves [pressed down with a stone or brick] for ten days. The liquid can be filtered through cloth [old cotton sari, etc] and each one litre diluted to ten litres in water and sprayed as an effective insect repellent for most cereals and vegetable crops. The farmers were shown life samples of the plants collected in their village and the procedure of how to use on a laptop presentation as well through a Q &A programme.

Soil Conservation at Wooling

During summer, the farmers in Wooling village of Samdrup Jongkhar Dzongkhag laid the dry maize stalks across the slopes amidst the stubble, reinforcing it with wooden pegs or stakes where needed. The dry straw in summer was unsuitable for fodder, directly or as silage, and hence this soil conservation measure of cost free. Wooden stakes were easily available from the nearby Community Managed Forests [CMF] provided by law in Bhutan. Soil conservation led to gradual reduction of gradient of the field plots along the hill slope and led to moisture conservation for the crops as well as recharge of mountain streams during the post monsoon period. They were also familiar with composting and only the techniques needed to be upgraded using the wealth of innovations validated by agronomists, microbiologists and other crop scientists in India and elsewhere. One farmer in Orang village recalled that he father would advise him to plant rice where earthworm castings were visible. This is indicative of good soil organic matter content and clayey soils.

Non Timber Forest Produce

The important Non-Timber Forest Produce [NTFP] was Chirata [*Swertia chirata*] that is collected and sold without any value addition by the villagers in the far-flung Eastern Geogs like Louri in Samdrup Jonkhar Dzongkhag. The farmer-collectors raised the issue of low prices obtained by them through sales by individuals to traders. Chirata is a medicinal plant that is permitted to collect by some Geogs by the Bhutan Forest Department [MoAF]. Major profits in the Chirata business were made by middlemen. The collectors were not even aware for what the plant is used and by which pharmaceutical units. According to Dasho Tashi Dorji, Rubia [*Rubia cordifolia*] used in medicine and for colouring as well as Star-shaped Anise [*Illicum griffithii*] are other important NTFP.

There is no regulated market for NTFP in Bhutan. There are also no standards for eco-certification for preventing over-exploitation and sustaining the production of NTFP

Bhutan can benefit from the standards and procedures being developed for India and other Asian countries through 'PGS-Wild', Keystone Foundation [www.keystone-foundation.org] and Government of India appointed committee on NTFP development. There is also a need to develop local value addition enterprises, markets and marketing collectives to help farmers get fair returns as well as to enhance the production of fruits, vegetables and local chillies in the district.

Existing Cooperative Movements and Challenges to Self Sufficiency

The farmers of the most of the Geogs other than the remote ones had no problems in the sale of oranges as they had a better road network. Though undergoing road-widening over the last two years and uneven or potholed, they were still motor able. However, most did not have access to common marketing systems for vegetables.

Cooperative marketing initiated for fresh milk and cottage cheese did not find a ready market in Dewathang and hence sold most of its produce in Samdrup Jongkhar town. Most Bhutanese preferred powdered milk for their tea and processed cheese [mostly the Indian cooperative AMUL brand] for their nation's favourite dish, Chilli-cheese [*Amed-achchi*]. The Indian traders in the border town were customers for the fresh milk. The JNP did not buy the fresh milk from the cooperative because of taste preferences and because the supply was available only at 10 A.M. by which time the students were in class. The JNP, the army and Chedra bought most of their vegetables from the *mandi* (local wholesale market) that has sprung up on the Indian side, across the porous international border check point from Darranga, Bhutan. Most of the traders, both Bhutanese and Indian, in Samdrup Jongkhar town and Dewathang also sourced their vegetables from this border market, well before the checkpoint on the Indian side.

Market surveys in the vegetable market on the Indian side of the border, Samdrup Jongkhar [2 km away] and Dewathang [18 km away] showed an addition of 20% at Samdrup Jongkhar and 30 to 50% at Dewathang on brinjals, radish, chillies, etc which are highly perishable and have about 20 to 25 % spoilage if not sold within the week. The margins are lower on ginger, potatoes, onions, etc which have a longer shelf life. The vendors in Dewathang sell vegetables to attract customers to buy groceries and other provisions. Some vendors tacitly acknowledge to the use of synthetic chemicals in sales of the produce e.g. bananas were artificially ripened with Carbide even in Dewathang town.

The vendors in Dewathang and traders in Samdrup Jongkhar were willing to sell fresh organic vegetables alongside the other vegetables. They also expressed their willingness to stack organic vegetables separately and even sell them with a reasonable premium if they were fresher than the regular vegetables. The customers would gladly pay more for better produce. Consumers already pay 30% more for local chillies over the chillies brought from Assam because of their superior quality. A beginning could be made in some of the kitchen gardens near Dewathang market. The possibility of covered cultivation of local chilli under poly-tunnels on bamboo frames during monsoons, with seedlings raised in kitchen gardens during late summer, needs to be explored. The price

of chillies soars to Rs.80/- per kg and local chillies are non existent in the market during monsoons.

The 'Way Forward'

There is a substantial demand for vegetables by institutions like the JNP, the Army mess and the vendors in Dewathang and Samdrup Jongkhar town supplying to the people residing or working in Samdrup District of East Bhutan. They are willing to source their vegetables locally if the prices are competitive, the quality is better and the supply of required quantities are assure on bi-weekly basis at a single point. That is the challenge before the Samdrup Jongkhar Initiative. A series of interventions are inevitable to achieve this:

- Focus should be built on select few commercial crops to first make the farming profitable. As per our observation thrust must be given to improve the orange cultivation as main crop of the area. Other two crops where expertise and consultancy required are Banana and Potatoes. Farmers can also start with intercrop of vegetables to supply to a cooperative for marketing.
- SJI should work as a facilitator in providing literature, training and items such as Biodynamic prep-kits, worms for Vermicompost etc. It should also liaise with various stake holders such as the Ministry of Agriculture at Thimpu and local dzongkhags in promoting organic farming amongst the various villages in its outreach.
- On slope farming on the mountains requires contouring for soil conservation and water retention. This must be encouraged as a best practice amongst farmers. Each cooperative must have a 'Best Practices' manual containing local experiences and practices such as basin management, compost methods etc.
- Start with creation of small cooperative groups at Dewathang which may leverage the existing cooperative infrastructure of the Milk coop to start marketing produce. This will provide a gradual scale of expansion without having to reinvent and reinvest in new schemes for marketing. This can also be a model case for SJI as a logical next step to forming and running organic cooperatives.
- SJI could possibly lease or adopt a set of farms for a period of a couple of years wherein models of organic farming techniques can be created for other farmers to refer to. Produce from these farms can be sold under a cooperative umbrella to subsist the farmers and this initiative. Work should be done in planning the model in a fair and sustainable manner.
- Identify farmers who can be organised into PGS 'Local Groups' in different villages of each Geog and complete the process to set up the LGs.
- Encourage expansions of forest since they will provide the lifeline in terms of water, timber and herbs. In case forests shrink the first casualty will be availability of perennial water sources which will be detrimental to agriculture in the long run.
- Twin the PGS Local Groups at the higher and lower elevations to grow the widest range of vegetables and cereals required locally.

- Set up one cooperative [with minimum 15 members as per Bhutan's laws], preferably from among the members of the 'Local Groups' of famers but including persons familiar with accounting and management/administration, to market the vegetables to the institutions and/or vendors, preferably starting with one from among these.
- Identify sources of crop seeds and other inputs necessary to cultivate crops.
- Plan a planting schedule as well as the crop mix and quantities to be grown and supplied by each farmer depending on his/her land holding and ability to grow.
- Train the farmers in growing the selected crops as per the best practices for soil preparation, nursery, transplanting, covered cultivation, etc. Use Bhutan Ministry of Agriculture & Forests books, brochures, posters, etc where available and suitable. [Also make this literature available to the Samdrup Jongkhar Agriculture officials who appear not to be familiar with the same.]
- Identify potential farmer- leaders for creating a cadre of local trainers through training of trainers [TOT] e.g. Mr. Jomo Tshering 17997088 for the Chirata collectors, Mr.Keshav Bhandari 17624430 and Dimiprasad Khatiwada 17863184 of Khamekham Bangtar
- Trouble-shooting in pre-sowing, nursery, transplanting, crop growth, harvesting, sorting, grading, packing, transportation and marketing phases.
- Monitoring, data analysis and periodic course correction.
- End of season review of crops, successes, failures, economic and planning for remedial action as well as up-scaling.
- Linking of existing Government schemes and subsidies, where available, to the ongoing SJI project farmers.
- Consumer awareness through flyers/hand-outs, publicity for success stories, newspaper reports

Meeting with Bhutan Prime Minister, H.E. Jigme Y. Thinley

The Prime Minister of Bhutan, H.E. **Jigme Y. Thinley**, took time off on 25 February 2011, during his visit to Samdrup Jongkhar town for the Mid-Term Review [MTR] of Bhutan's 5-year plan to evaluate the progress of Samdrup Jongkhar Initiative [SJI] activities to promote Organic Agriculture and collective marketing groups. Dasho Tashi Dorji and 'Tashi' Ronald Colman represented SJI for the meeting along with the OFAI Resource Persons from India in an interaction scheduled for 15 minutes but that lasted almost one hour due to the keen interest of the PM in organic agriculture that was to be also dovetailed into the tourism policies of this Himalayan country. The Prime Minister was flanked by the Finance Minister, Mr. **Wangdi Norbu**; Health Minister, Mr. **Zonglay Drogba**; Secretary for Agriculture, Mr. **Sherup Dorji**, and the Protocol Officer.

The Bhutanese national objective of Gross National Happiness [GNH], the Buddhist culture of protecting all living creatures and the SJI aim of promoting livelihoods and food security in Samdrup Jongkhar Dzongkhag [District] of East Bhutan have a convergence with the practices of Organic Agriculture [combining tradition, innovation

and science for benefit of all living beings in an environment friendly way]. The process has been set in motion with the SJI's flag off by the Prime Minister of Bhutan in December 2010.

Tashi **Ronald Colman** briefed the Prime Minister, Finance Minister, Health Minister, and Secretary for Agriculture, Mr. **Sherup Dorji**, of the training workshops conducted by SJI with the assistance of Navdanya-Dehradun members **Vandana Shiva, Vinod Bhat and Negi**, followed by **Jimmy and Janak McGilligan** of Barli-Indore and currently with the Organic Farming Association of India [OFAI] members **Ashish Gupta, Vikram Rawat and Miguel Braganza** to make the people of Samdrup Jongkhar self-sufficient in food at home and in every village while ensuring the health of all, soil, environment and every living creature through organic agriculture, value addition and collective marketing at local, district and national level.

Dasho **Tashi Dorji**, former People's Representative from Dewathang, detailed the programmes conducted by the OFAI team in various villages across Samdrup Jongkhar under his personal guidance since 18 February 2011. He also touched upon the need to set guidelines for the collection of Bhutan's rich wealth of NTFP, specially the medicinal plant Chirata [*Swertia chirata*] that is collected and sold without any value addition by the villagers in the far-flung Eastern Geogs like Lauri in Samdrup Jongkhar Dzongkhag. There is also a need to develop local value addition enterprises, markets and marketing collectives to help farmers get fair returns as well as to enhance the production of fruits, vegetables and local chillies in the district.

Dasho informed the PM that an average of 60 farmers had attended each workshop and more than one hundred had attended the sensitization seminar at the Jigme Namgyel Polytechnic in Dewathang. Totally about 600 farmers had benefited from the visit of the Resource Persons from OFAI. Three members of the Organic Farming Association of India [OFAI], Mr. Ashish Gupta, Mr. Vikram Rawat and Mr. Miguel Braganza, conducted trainings with translation by Dasho Tashi Dorji, who has now the capacity [both knowledge and skills] to conduct the lecture-demonstrations independently. In fact, the OFAI team acknowledged that Dasho Tashi Dorji had conducted demonstration of Cow Pat Peat pit preparation for Bio-Dynamic [B.D.] farming and also given independently the explanation in Bhutanese of the simple to understand Sanjivak and Panchagavya preparation in Orang village and Dewathang town during the preceding two days. He had keenly observed the demonstrations and taken notes of explanations to master the same. Some of the farmer participants in different villages had done the same. Dasho Tashi Dorji acknowledged that he had been unknowingly using the term 'organic by default' whereas the farmers were really '**organic by tradition**'. This needs to be acknowledged by all.

Speaking on behalf of the OFAI team, Miguel Braganza, Additional Director at the OFAI Central Secretariat in Goa, drew attention to the fact that Organic Agriculture was compatible with the Bhutanese national objective of Gross National Happiness [GNH] and the Buddhist culture of protecting all living creatures**. Organic Agriculture i**s a production system that sustains the health of soil, ecosystems and people, **combining**

tradition, innovation and science, and it promotes fair relationships and **a** good quality of life for all involved. PGS helps build Local Groups of organic farmers to achieve it. Poison-free food also reduced the pressure on the healthcare system by reducing incidence of ulcers, tumors, migraine headaches and cancers due to toxic chemicals used as insecticides, herbicides, etc. Thus OA has complete convergence with the objectives of GNH in Bhutan.

He explained that the core competence of the OFAI Resource persons in cultivation of fruits like oranges and vegetables organically in high altitudes, collection and marketing of the organic fruits and vegetables as well as capacity building and networking of farmer groups for collective marketing have been fully utilized during the past week. In most villages, the OFAI workshops, ably supported by Dasho Tashi Dorji with translations and local inputs laced with humour, were extended beyond the scheduled time to answer the various queries of the participating farmers, who were enthusiastic and wanting to learn more. In Orang village, the Agriculture Supervisor-1 Mr. Ashok Kumar Pradhan attended the full workshop, including the demonstrations, and provided inputs on the activity of the RNR Extension service for soil testing and crop cultivation. Ashish Gupta and Vikram Rawat also shared their experiences and assessment of the status and the possible organic way forward for the farmers in Samdrup Jongkhar Dzongkhag.

Ashish Gupta emphasized that organic agriculture was ahimsa in practice. The journey from the soil to the soul and vice versa would in fact build this into the very fabric of the agrarian society. In addition to soil health, chemical-free OA also enhanced the health of the consumers. Since OA and PGS promoted local consumption of the organic produce, health of the organic farmers was also ensured as they are the first consumers. OA will promote a healthier nation. He also discussed that all that was needed in terms of biomass was easily available in the soil due to the presence of a health forest eco system. In addition it should be the goal that all fruit present in the room should actually be made available locally in Bhutan and not have to be imported from other countries.
Vikram Rawat informed the PM and others that he was a farmer speaking from personal experience. In Himachal Pradesh, his apple-based production system also had other fruits and vegetables on the farm that catered to the market in Delhi. The Karsog Valley Farmers' Group had about 500 farmers networked through a number of farmer-managed micro-collection centres and five bigger collection centres for locally produced exotic vegetables that were marketed collectively. He volunteered to help create similar capacities in farmers of a village that may be identified by SJI in Bhutan for collective marketing of organic produce.

The Agriculture Secretary, Mr. Sherup Dorji, responded to the PM's specific query and stated that SJI was a good movement further for OA in Samdrup Jongkhar Dzongkhag. He was happy to assist SJI to further its goals. He informed that there was a felt need to do value addition through post harvest processing of Chirata and perhaps solar driers could help in this direction. The NTFP collector should be able to earn more by some processing of chirata, he felt. He stated that the Bhutanese oranges needed more attention. Citrus dieback, Greening [or Tristeza], bacterial canker and other diseases needed to be attended to. Community Forest Management could include the production of Bamboo

shoots as vegetable in addition to other local [eg Sag, red potato, chilli] and exotic vegetables [eg Cole crops] grown by organic farmers. Mr. Ron Colman informed that the Director had done his doctoral studies in NTFP and his services could be tapped for this. The Health Minister, Mr. Zonglay Drogpa, exclaimed in jest,"I think I should now resign and come back to do farming."

The Prime Minister responded to the interaction and suggestions stating thus, "This was very educational for me. Earlier, I had the joy of launching the Samdrup Jongkhar Initiative, where I was deeply heartened to note the enthusiasm of the farmers. They listened attentively and had questions to ask from the resource persons. I did not know how far this initial enthusiasm would be sustained and converted into actions on the ground. I had tried before but we did not make much progress then. Now I hope to see it make a difference." He went on to add, "Chemical usage is quite recent in Bhutan, perhaps from the fifth Five-Year Plan about 25 years ago. I am happy to note that traditional wisdom and traditional agricultural practices still prevail in Bhutan."

In a telling remark, the PM said, "The Government agencies have promoted use of chemicals. The Government of Bhutan regrets what it has done to promote chemicals in farming. We want to change." He informed that he had made a statement about OA in April 2008 when the PM of India visited Bhutan and was asked by his counterpart where Bhutan would sell the organic produce. "I told him that we were not looking at distant markets like Europe and Japan. We would look at India as our market. After all, twenty years ago we did not believe people would buy bottled drinking water. Things change. Now people buy mineral water because of their health. They will also buy organic food." Export is not the only market that the PM wants Bhutan to look for. "We will promote the consumption of organic produce within Bhutan. In Bumthang, we have promoted family-owned hotels for tourists. We are going to have an airport in this region. I have asked the local government to put a ceiling on the size of hotels. Also, all hotels of 'three star' and above category will have to use only organic produce for the food they serve. 'Soil and Soul' fits well in the Ahimsa philosophy. We will also need to pay attention to standards, packaging and marketing," he said, adding "The district of Haw has already declared itself as 'Organic'. The other Governors have also been sensitized on the need for organic systems. However, I have not seen a major involvement of the Ministry of Agriculture and the [RNR Extension] officers did not take the benefit of the resource persons at the SJI program."

Turning to the SJI representatives he advised, "You may need to be more specific in your planning and produce visible results. OA is high on the Government's list of priorities and my personal priority. We love to live in harmony with Nature. I am happy that you are here today."

Organic Farming Techniques Discussed

This section contains s description of certain organic farming techniques discussed by the OFAI team during their visits to various villages.

Sanjeevak or Amrut Paani

20 litres of Sanjeevak preparation Technique requires -
10litre Cow Urine – collected over 1-2 days.
10kg Cow Fresh Dung
1kg Jagerry [Gur]
Mix all these together in a bucket and keep covered with a cloth to avoid flies. The bucket should be stirred twice a day for 7 to 10 days. After 10 days Sanjeevak will be ready for use. It must be used in a dilution of 1:9 i.e. for 1litre of Sanjeevak 9 litres of water should be mixed to obtain 10 litres of solution.
Sanjeevak can be applied to plants as a spray or directly applied to the soil. In case of trees, a boundary basin of 2mx2m can be created and solution poured directly at this basin. Sanjeevak can easily be stored for 2 months in an earthen pot but must be kept moist and aerated.

Panchgavya

This powerful potentate and pest repellent is an excellent compound for Organic farming. It has a multipurpose mix which is easily made in every farm and gives excellent results when applied to the soil or the crops. The word Panchgavya is a portmanteau consisting of the words '*Panch'* meaning five and '*Gavya'* meaning products from a cow. To make 20 litres of Panchgavya requires –

- Fresh cow dung - 5kg
- Fresh cow's urine – 3 litres
- Cow's milk – 2 litres
- Cow's curd – 2 litres
- Cow's ghee – 500 gms

First cow dung and cow ghee are thoroughly mixed for 20 minutes and kept in a mud pot or plastic drum (it is important not to use a metal container for this preparation). This mixture is to be kept for 4 days with stirring twice a day. The container must always be covered with a moist cloth to avoid flies laying eggs in it. On the 5th day all remaining elements are to be added and stirred well for 20 minutes. After 15 days (with stirring twice a day) panchgavya is ready.

In addition to the 5 elements following can also be added for additional benefits if the materials are available –

- Jaggery -500gms
- Ripe Banana – 12 pieces
- Tender Coconut water – 3 litres
- Honey – 500gms

Panchgavya is to be applied in a 2-10% solution e.g. for 10 litres of water 200ml of panchgavya can be used for spraying directly on plants or if applied to soil, 1litre of panchgavya is stirred with 10 litres of water.
It can be applied once in 15 days on all kinds of crops. Seeds can be soaked for 1 hour in 1% solution before sowing and stem cuttings for plantations can be soaked in 1% solution overnight.

Cow Pat Pit

Cow Pat Pit of CPP is a highly specialized composting method which uses Fresh Cow Dung and biodynamic preparations to form an effective potentate. The quality of CPP depends of the quality of inputs used and the methodology adopted for making the compost. It is highly advised that cow dung be used from a lactating cow which has been fed organic grass only e.g. fodder from open or forest field of grass collected from own farm where no chemical inputs have been used. Preparation of CPP requires –

- A pit dug to the dimensions of 3feet width, 2 feet length and 1 feet depth. Multiple pits can be dug width to width or length to length.
- Bricks to line the sides of the pits
- BD Preparation Kit 502-507 made available by SJI through the RNR centre at Thimpu.
- Shaded ventilated area where the pits will be kept to prevent water logging during monsoons or harsh sun during summers.
- 60kg cow fresh dung per pit or watered cow dung in case it is hard
- 200 grams of powdered egg shells – preferably roasted on a covered vessel or oven for 10 minutes.
- 200 grams of powdered basalt dust from a quarry OR bore/tube well soil OR Silt from river beds as a last option

The preparation requires kneading the cow dung for 10 minutes to aerate it. Mix the powdered egg shells and basalt and continue kneading. While there is no limit to the time to knead, between 10 minutes to an hour should be enough. Drop this mixture into the pit and layer it such that it is one and half brick deep.

Six holes are made into this dung mixture in pit and in each hole 3 sets of BD preps are inserted i.e. in one of the holes 3 sets of BD 502, in second hole 3 sets of BD 503 and so on. The holes are then covered with the dung. One set is about 1 gram so about 3 grams of each prep in each hole is enough.

Take a 1 litre water bottle with about half a litre of water and add 1 set of BD 507 solution to it. Shake the bottle horizontally for about 10 minutes. Add half of this water to the final hole and remaining half to the bricks, gunny bag and on top of the layer. Alternately half of the BD 507 can be added directly to the last hole and remaining mixed in the bottle. Place a wet jute sack on top of this pit to keep it covered and moist. Leave this for a month and then gently aerate it from the top with a fork in the 5th week. From 6th week onwards turn the compost every week to speed up breakdown. CPP will be ready in 3 to 5 months depending on climatic conditions.

1 pit with 60 kg of cow dung yields about 35-40kg of CPP. The application thumb rule is 1kg per acre. Some uses are –

- 1kg CPP in 40 litres of water is stirred for 10 minutes and strained. The solution can be sprayed directly on the plants and trees or applied directly to the soil.
- Make a CPP paste and apply to trees to stop bleeding

- Dip roots, stem and seeds in a CPP solution for 1 hour before sowing
- CPP can be used as inoculants in other compost heaps of vermicompost also. Usage remains the same 1kg CPP in 40 litres of water and added to compost heaps by making holes on them.

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Dasho Tashi Dorji, local coordinator of SJI and former representative of Dewathang in the King's Council, Orong and Dewathang;

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- Biodynamics India – An online reference to biodynamic methods such as BD Preps and CPP and practices for organic farms at www.biodynamics.in.
- Panchgavya – A Manual Dr. K.A. Natrajan

APPENDIX 7
Annual crop calendar
Navdanya's Biodiversity and Conservation Farm, Ramgarh

SN	Common name	English name	Botanical name	Month of sowing	Month of harvesting
1.	Gehun	Wheat	Triticum aestivum	Oct.-December	April
2.	Jao	Barley	Hordeum vulgare	Oct.-December	April
3.	Lentil	Masur	Lens culinaris	Sept.-October	Dec.-January
4.	Jai	Oat	Avena sativa	Oct.-December	April
5.	Chana	Gram, Bengal gram, or Chick pea	Cicer arietinum	October	April
6.	Barsim	Egyptian clover	Trifolium alexandrinum	Oct.-Nov.	Feb.-April
23.	Pudina	Mint or Peppermint	Mentha piperita	February	till June

1.	Matar	Peas	Pisum sativum	Sept. – October	December
2.	Desi Methi	Fenugreek	Trigonella foenumgraceum	Aug.-November	Sept.-April
3.	Lal Mooli	Radish	Raphanus sativus	July-October	Sept.-Dec. (for veg.) April (for seed)
4.	Palak desi	Spinach	Spinacia oleracea	Aug.-November	Nov. to January
5.	Safed Mooli	Radish	Raphanus sativus	July-December	Nov.-March
6.	Kasuri Methi	Fenugreek	Trigonella foenumgraceum	Oct.-December	Nov.-March
7.	Rai Barik	Indian or Brown mustard	B. juncia	Sept.-December	Oct.-March
8.	Dhaniya	Coriander	Coriandrum sativum	Sept.-January	Oct.-April
9.	Palak pahari	Spinach	Spinacia oleracea	Oct.-December	Nov.-January
10.	Methi	Fenugreek	Trigonella foenumgraceum	Sept.-December	Oct.-March
11.	Alu	Potato	Solanum tuberosum	Sept. & December	Dec. & March
12.	Pyaj	Onion	Allium cepa	September	Feb.-March & April-May
13.	Gajar	Carrot	Daucus carota	Sept.-December	Jan.-March
14.	Barik lahsun	Garlik	A. sativum	October	May
15.	Mota lahsun	Garlik	A. sativum	September	April
16.	Soya	Dill seed	Anethum graveolens	Oct.-December	April
17.	Band Gobhi	Cabbage	B. oleracea var. capitata	October	January-February
18.	Phool Gobhi	Cauliflower	Brassica oleracea var. botrytis	October	January-February
19.	Desi matar	Pea	Pisum arvense	December	April
20.	Sev chana	Broad, Windsor	Vicia faba or Faba vulgaris	Sept.-November	Feb.-March
21.	Shaljam	Turnip	Brassica rapa	Sept.-October	Nov.-December
22.	Chukander	Beet root	Beta vulgaris	Sept.-October	Nov.-December

1.	Moti Sarson	Turnip rape	Brassica.campestris	Oct.-December	March
2.	Toria	Indian rape	B. campestris var. toria	Sept.-October	Dec.-January
3.	Alsi	Linseed or Flax	Linum usitatissimum	Oct.-December	March-April
4.	Rada	Yellow mustard	Brassica campestris	Oct.-December	March
5.	Surajmukhi	Sunflower	Helianthus annuus	June-September	April-May
6.	Teera			Oct.-December	April-May

SN	Common name	English name	Botanical name	Month of sowing	Month of harvesting
1.	Sati	Paddy, Rice	Oryza sativa	May - July	September-October
2.	Ragi, Mandua	Fingertail millet	Elusine coracana	June- July	September-October
3.	Kauni	Foxtail millet	Setaria italica	June- July	September
4.	Jhangora	Barnyard	Echinocloa crusgali	June- July	September
5.	Bajra	Pearl millet	Pennisetum typhoides	June- July	September
6.	Mungri	Maize	Zea mays	June- July	August
7.	Mung	Green gram	Phaseolus aureus	June- July	October
8.	Lobia	Cowpea	Vigna sinensis	June- July	October
9.	Kala bhat	Black bhat	Glycine indica	June- July	November
10.	Dhencha	Sysbania	Sysbania sps.	May- July	July-Aug. & Oct.-Nov. November
11.	Sani		Crotalaria sps.	May- July	July-August & Oct.-November
12.	Jowar	Sorgham, or Great millet	Andropogon sorgham	May- June	September
13.	Ganna	Sugarcane	Saccharum spp.	March	January (3 harvests)

1.	Bhindi	Lady's finger	Abelmoschus	March & June	May-June & Aug.-September
2.	Mirch	Chilli	Capsicum annum	March-April	July-August
3.	Bhatta	Brinjal	Solanum melangena	March-April	Whole year
4.	Kakhri	Cuccumber	Cucumis sativus	June	August-September
5.	Kali tori	Ridge gourd	Luffa acutangula Roxb.	June	August-October
6.	Karela	Bitter gourd	M. charantia	May	August-September
7.	Lauki, Ghia	Bottle gourd	Lagenaria siceraria	April-May	August-December
8.	Chachinda	Snake gourd	Trichosanthes anguina	May	August-September
9.	Frasbean	Frenchbean	Phaseolus vulgaris	March	April-May
10.	Adrak	Ginger	Zingiber officinale	May-June	Dec.-Jan.
11.	Haldi	Turmeric	Curcuma domestica	June-Aug.	Dec.-Jan. (After $1^{1}/2$ year)
12.	Kaddu	Pumpkin	Cucurbita maxima	April-June	August-October
13.	Chaulai	Amaranth	Amaranthus viridis	May-June	July-September
14.	Arabi	Arum or Elephant ear	Colocasia esculenta	June	July-December
15.	Bathua	Goosefoot or common pig weed	Chenopodium album	May-June	July-September
16.	Tulsi	Ocimum		July-August	Whole year

1.	Til	Sesame or Gingelly	Sesamum indicum	June	September
2.	Mungphali	Peanut or Groundnut	Arachis hypogaea	June	Sept.-October
3.	Philangi	Niger		June	Sept.-October

APPENDIX 7: Background statistical material prepared for profile of Samdrup Jongkhar

RESEARCHED AND COMPILED BY TSERING OM: 2010-11

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Samdrup Jongkhar is situated in the south eastern part of the country. It shares its borders

with Pemagatshel Dzongkhag in the west, Trashigang Dzongkhag in the north and the Indian states of Assam and Arunachal Pradesh in the south and east respectively.

The dzongkhag is administratively supported by 2 dungkhags. Samdrupcholing Dungkhag comprises of 4 gewogs: Martshalla, Pemathang, Phuntsothang and Samrang. Jomotsangkha Dungkhag has 3 gewogs: Lauri, Serthi and Langchenphu. The rest of the gewogs — Gomdar, Wangphu, Orong and Dewathang — are directly administrated by the dzongkhag administration.

The dzongkhag has a population of 35,960 and a total of 7,453 households (2009). It has a total area of 1,878.79 sq. km with elevations ranging from 200m to 3,600m above sea level. The major portion of the land falls within an altitude ranging from 600m to 1,200m. The flattest areas are in the southern portions with wide valleys and river beds. 77.3% of its total land area is under forest cover comprising mainly broad leaf subtropical evergreen forest.

The soil type varies from sandy to clayey loam which is suitable for agricultural production. Most of the gewogs are prone to landslides and soil erosion due to loose soil. The majority of settlements are located in the foothills where the soil is most fertile. With large fertile plain areas in the subtropical climatic zone, rich mineral deposits, and many industries, the dzongkhag has potential for agricultural and economic activities. However previous security issues, particularly until 2004, and rough terrain have been major challenges for planned socio-economic activities.

SOCIAL AND ECONOMIC RESOURCES

Demography

The total population of Bhutan in 2009 was estimated at 683,407. The demographics of Bhutan show that it is a country with a low and relatively dispersed population, with people living at an average density of 17 persons/km^2. The population is slowly growing with a 1.3% natural growth rate. (Source: PHCB 2005).

An increasing number of people are moving from the rural areas into towns to seek better economic rewards. By 2007 almost a third of the population (26.4%) was living in urban areas. By October 2009, the internal migration rate was 6%, the highest in South Asia, according to UNDP's Human Development Report. The main factor that triggers this movement is education and employment. The estimated average annual growth of the urban population in Bhutan was 7.3% during 2000–2005 (while the national growth rate was 1.3%), and as high as 12.6% in Thimphu city. This rapid urban growth has already created severe pressures on services such as water shortages, lack of sanitation and waste disposal facilities, as well as environmental and serious socio-economical concerns.

Samdrup Jongkhar is typical of most dzongkhags, as it contains a small number of towns (Samdrup Jongkhar, Dewathang, Bhangtar,and Daifam), and large areas of countryside in which people live in small scattered communities. The total projected population of

Samdrup Jongkhar for 2010 is 37,306 (5.45% of the national population), an average dzongkhag population, though the range between dzongkhags is quite extreme. Thimphu has nearly 90,000 and Gasa contains fewer than 4,000 people.

The projected gender distribution in Samdrup Jongkhar is 19,122 males and 18,184 females. In 2005, the population in the district diminished by 7.3%. 26.3% (9,945) of this population lives in the four towns, while the rest are rural farmers. The two most populated towns are Samdrup Jongkhar town and Dewathang.

The dzongkhag offices, district court, and main police stations, divisional forest offices, banks, and bus station are located in Samdrup Jongkhar town. It has 5,058 inhabitants. Due to its location at the south-eastern border of the country, Samdrup Jongkhar town is considered as the eastern gateway to Bhutan and it is the commercial hub for the six eastern dzongkhags of Bhutan. Farmers from Trashigang, Mongar, Lhuentse, Trashi Yangtse and Pema Gatshel sometimes bring their products for sale to Samdrup Jongkhar and buy necessary household provisions.

With increasing urbanisation and the rapid increase in population, the town is facing problems of urbanisation like congestion, lack of infrastructure, pollution, waste disposal challenges, and water shortages.

Another growing town is Dewathang, situated 18 km from Samdrup Jongkhar town. It has 3,490 inhabitants. The other two towns, Bhangtar and Daifam, are still relatively small. For these growing towns, the dzongkhag administration has already identified necessary activities to ensure proper urban development. These include acquisition of land, survey and demarcation, construction of urban roads, a storm water drainage system, public toilets, market sheds, urban drinking water, solid waste disposal, parking, and street lighting.

Household Composition

According to BLSS 2007, the average household size nationally is 5.0. The average age of a household head is 45.3 years. The percentage of household heads under 60 years old is 20% higher in urban areas than in rural areas. Household heads are defined as those in charge of making economic decisions for the household. Nearly one third of household heads are women. Around 4% of all households are single-person-households.

Samdrup Jongkhar has 7,453 households with an average of 4.4 persons per household. Samdrup Jongkhar has the lowest percentage of women household heads of any dzongkhag in the country at only 5.4%. The national average is 30.7%, with the highest percentage in Bumthang at 64.6% and the second lowest after Samdrup Jongkhar in Samtse at 12.2%. Interestingly, data from The Poverty Analysis Report (source: PAR 2007) show that three of the poorest dzongkhags in Bhutan have the lowest rates of women household heads in the country.

Gender

According to BLSS 2007, the percentage of female household heads in Bhutan is

considerably lower in urban areas (21%) than in rural areas (35%). The share of female household heads who are married is also larger in rural areas (27%) than in urban areas (16%). However, the percentage of female household heads who are unmarried but "living together" with partners in their household is more than twice as high in urban areas as in rural areas. More than six in ten Bhutanese household heads who are divorced, separated, or widowed are female.

Additionally, extended family members reside within one home much more often in rural areas (20%) than in urban areas (12%). Children reside in 73.7% of all households in Bhutan. The overall sex ratio is estimated at 96 males for every 100 females.

Age

Nearly half the population of Bhutan is below 20 years of age; and three in five persons are below 30. Children (below 15 yrs.) account for one third of the population, while the elderly (aged 60 and above) consist of less than 10% of the population.

The age structure in Bhutan yields a dependency ratio of 69%. That is, for every ten persons in the economically productive ages (15-59 yrs.) there are seven "dependent" persons – persons under 15, or over 60 yrs. old. When looking at the projected population in 2010 from the 2005 census data, the same analysis can be applied to the Samdrup Jongkhar population. (Source: PHCB 2005)

Marital Status

In Bhutan, between the ages of 15-19 years, three in twenty females are married, while only one in twenty males are married. The majority of married persons are aged 20 to 39 years, with approximately seven in ten persons in this age group being married.

In 2007, 42.3% of the population (43% females; 42.3% males) in Samdrup Jongkhar was married, 53.6% (51.9% females; 54.6% males) had never been married, 0.9% (0.9% females; 0.8% males) were divorced, 0.1% (0.2% females; 0.0% males) were separated, and 3.1% (4.0% females; 2.3% males) were widowed. Marriage seems to be a phenomenon slightly more present in urban (44.4%) areas than in rural (42.7%) areas. (Source: BLSS 2007).

Ethnic groups

The population of Bhutan includes many ethnic groups such as the Sharchops from the east, Ngalongs from the west, Khengpas from the central region, nomads from the north, and Lhotshampas from the south. These (and others) are all found in Samdrup Jongkhar Dzongkhag. Sharchops are the most numerous group followed by Lhotshampas.

Because of the mix of ethnicities, a wide variety of dialects is spoken in Bhutan, of which Dzongkha, Khengkha, Sharchop, and various dialects of Nepali are the most common. The majority of the Bhutanese population is Buddhist (around 70%) and the remainder are mainly Hindu, located mostly in the southern areas.

Labour force

The BLSS categorizes persons 15 years and older into (a) those in the labour force – which includes those both employed and unemployed (but willing and able to work) – and (b) the economically inactive – those not working because of temporary illness, study, disability, family duties, etc.

The country's unemployment rate in 2007 was estimated at 3.7%. High unemployment rates are prominent in the age group 15 to 24 years, reaching one in four people, five times the rate of other age groups, especially in urban areas. The labour force participation rate is estimated at 67.3%.

Among the estimated 274,000 employed persons in Bhutan, two thirds are employed in the agriculture sector; three out of twenty work in industry; and three out of twenty work in the services sector.

Those without schooling comprise 77.4% of the economically active population nationwide. Those with higher secondary and tertiary education and above make up only 2.7% of the economically inactive populace, but, perhaps surprisingly, 33.7% of the unemployed. Because those results are counter-intuitive, with highly educated people globally more likely to be employed than those with less education, these data will require further study to determine whether or not there is actually a correlation between level of education and unemployment and what its causes might be.

There are distinct urban/rural, female/male, and youth/adult disparities in employment and in labour force participation. For example, in urban areas only 41.5% of women participate in the labour force, while 76.8% of men participate. This disparity is considerably smaller in rural areas where the male labour force participation rate is only 6.3 percentage points higher than the female rate.

In the urban areas, the gender disparity is especially evident in comparing unemployment rates. The male unemployment rate in urban areas is 5.3% while the female rate is 9.5%. On the other hand, in rural areas, the disparity disappears, with males having a rate of unemployment of 2.9% and females 2.7%.

Additionally, the urban unemployment rate (6.8%) is more than double the rural rate of unemployment (2.8%). Youth aged 15-24 have the highest rates of unemployment (9.9%) in the country. But if the focus is narrowed to urban areas, young people have an unemployment rate of 24.7%, while the next age demographic (25-34 year olds) has an unemployment rate of only 2.4%.

In all these statistics, it must be recalled that unemployment rates are determined only for those classified as active in the labour force and who are actively looking for work. Discouraged workers, who have given up looking for work, are not included. As well, those who are 'picky' about their work and unwilling, for example, to take available manual labour that they consider below their qualifications, may not be included. It is therefore likely that the actual proportion of youth wishing to work is higher than the

official unemployment rates.

More than two-thirds of Bhutan's working population works in agriculture. In rural areas 90% of employed women work in agriculture, while only 75% of employed men do. Another gender disparity is present in urban areas, where three out of five employed men work in services (i.e. government, corporations) and over half of employed women work in industry.

In Samdrup Jongkhar the labour force participation rate is 68.21%, just above the national average of 67.3%. This means that more than two-thirds of the Samdrup Jongkhar population is economically active. However, unemployment in Samdrup Jongkhar is 4.46%, slightly higher than the Bhutanese average of 3.7%. Mongar has the highest labour force participation rate (79.57%) and the lowest unemployment rate (0.98%), while the highest unemployment rate is right next door in Lhuentse Dzongkhag (15.84%).

The gender distribution of the labour force in Samdrup Jongkhar shows that men are more likely to have a job than females. Men account for 71.3% of labour force participation while women account for 65%. Unemployment rates show the disparity as well with the male rate at 3.8% and the female rate at 5.2%.

Source of income

In Bhutan, the main primary source of income is own-farm enterprises, followed closely by wages. In urban areas, seven out of ten households derive their primary income sources from wages, while three-fifths of rural households report own-farm enterprises as their major source of income.

The BLSS 2007 data show that the most important source of income in Samdrup Jongkhar Dzongkhag is wages, with 44% of the population depending on them. People owning their own farm enterprise make up 12.3% of the population, while 10.2% have their own business. (Source: BLSS 2007).

The RNR census of 2009 shows that in 2008, the highest source of income for Samdrup Jongkhar farm households was off-farm activities with 74.2% (compared to 72.8% in Bhutan) of households living from this source. The second most important source of income was horticulture with 64.8% of Samdrup Jongkhar farm households living from this, compared to 59.4% in Bhutan. The third most important source of income was livestock products for 37.5% of Samdrup Jongkhar farm households, compared to 33.6% in Bhutan. (Source: RNR census 2009).

Agricultural production in Samdrup Jongkhar accounted for 83.1% of the monetary income of rural households for 2008. (Source: RNR Census 2009). Although Samdrup Jongkhar has a wide range of non-wood forest products (NWFP) and uses 94.7% of the dzongkhag's community forests for that purpose, these are not yet a major source of income for most rural households in the dzongkhag, with just 11.8% of those households benefiting from them. But this is still more than double the national rate of 5.6%. The

RNR survey shows that among 79% of Samdrup Jongkhar rural residents, the number one mechanism to cope with food shortages is the sale of NWFP (78.95%).

In the dzongkhag, the cereal that generated the highest income in 2008 was rice (Nu. 7,440 million, 7.5% of the value of all rice produced in Bhutan). The vegetable with highest generation of income in Samdrup Jongkhar was potatoes (Nu. 4.4 million, equivalent to 1.7% of the value of all potato production in Bhutan). The dzongkhag produced Nu. 5.76 million worth of ginger (12.6% of the value of ginger produced in the whole country). As for fruits, Samdrup Jongkhar produced Nu. 67 million worth of mandarins (10.9% of the mandarin sales generated by the country as a whole).

The main source of credit for Samdrup Jongkhar households is relatives and friends (59.4% of households seeking credit). 11% have no access to credit and only 9.3% have recourse to the bank.

Poverty

The Bhutanese definition of poverty according to the 2007 Poverty Analysis Report (PAR 2007) is as follows: "A household and all its members are considered poor if the household per capita consumption level is insufficient to acquire a given level of goods and services regarded as essential for a minimum standard of living". The poverty line definition is as follows: The total poverty line is calculated by adding the food poverty line and the non-food poverty line. The authors used the Nepalese calorie requirement to determine the Bhutanese food poverty line.

The Bhutanese food poverty line is Nu. 688.96 per person per month. Those citizens consuming less than this amount are considered 'subsistence poor'. The non-food poverty line in Bhutan is Nu. 407.98 per person per month. Therefore, the total poverty line (TPL) in Bhutan is Nu. 1,096.94 per person per month. Those Bhutanese citizens consuming less than the total poverty line sum are considered poor.

Poverty in Bhutan's urban areas (1.7%) is significantly lower than in rural areas (30.9%). Only 5.9% of the national population is subsistence poor (i.e., persons belonging to families with per capita consumption below food requirements). Poverty rates are found to be high in Zhemgang, Samtse, Mongar, Lhuntse, and Samdrup Jongkhar. Among these dzongkhags, Zhemgang and Samtse have the highest poverty rates.

In 2007, the number of Bhutanese living below the poverty line was estimated at 146,000 people, 23.2% of the Bhutanese population. The poverty rate has fallen dramatically in recent years, from 36.3% in 2000, to 31.7% in 2003, to 23.2% in 2007. However, subsistence or food poverty rose from 3.8% in 2003 to 5.9% in 2007.

The poverty severity ratios at both the national level and in rural areas respectively declined from 3.1% to 2.3% and from 3.8% to 3% between 2003 and 2007. In Samdrup Jongkhar, 15.2% of residents living below the poverty line live in Lauri Gewog, 13.2% in Phuentshothang, 11.2% in Orong, 10.9% in Gomdar. and 10.1% in Wangphu.

On the basis of individual consumption expenditures, the National Statistical Bureau (NSB) determined an annual income of Nu. 13,164 as the national poverty line. Of this amount, Nu. 8,268 is typically spent on essential food products, and Nu. 4,896 goes towards non-food items. Poverty in Bhutan is almost exclusively a rural phenomenon. Around 98% of all the poor in Bhutan live in rural areas, with most of the poor primarily engaged in subsistence farming as their primary occupation.

The average monthly household consumption expenditure (HCE) for Bhutan is estimated at Nu. 13,823 while the average per capita consumption expenditure was found to be Nu. 2,755 per person per month. Average HCE in urban areas is 1.9 times that of rural areas. Average household consumption among the richest 20% (Nu. 25,181) of the per capita consumption expenditure distribution in Bhutan was more than four times that of the average household consumption of the poorest 20% (Nu. 5,704). Although only 30% of the household population resides in urban areas, the urban population accounted for practically half of all purchases. The rural population accounted for 96% of consumption for home-made products.

In Samdrup Jongkhar, the mean total household expenditure is Nu. 10,662 per month, which is more than Nu. 3,000 a month less than the national average (Nu.13,823). Per capita total consumption is Nu. 1,980, considerably less than the national average of Nu. 2,755. Lhuentse has the lowest per capita consumption, at only Nu. 1,553 a month.

Unlike most parts of Bhutan, Samdrup Jongkhar's non-food consumption is higher than its food consumption (by approximately 20%). For the majority of dzongkhags (except for Thimphu, Paro, and Bumthang) food consumption is more than 20% higher than non-food consumption as a proportion of total consumption.

Rural Poverty

It is widely acknowledged that poverty is an inherently complex phenomenon that must be understood and measured in a given socio-economic, cultural, and geographical context. Poverty measurement based solely on income is inadequate, and there is a great need to look at other dimensions such as access to finance, land, and resources, the natural environment, and agricultural productivity.

A new report, produced by the National Statistics Bureau in collaboration with the GNH Commission and World Bank, overlaps gewog level maps on headcount poverty with maps on other geo-referenced data such as market accessibility, access to education, agricultural productivity, electrification, housing quality, and gender. It is intended to examine other indicators in the future, such as transport infrastructure, public service centres, soil quality, human development, agro-climatic information, access to improved drinking water and sanitation, and health, for example.

The poverty-mapping was carried out by the NSB, GNHC and World Bank using a "Small Area Estimation" (SAE) method developed by Elbers et al. (2003) [Elbers, C., J.O. Lanjouw, and P. Lanjouw. (2003) "Micro-level Estimation of Poverty and Inequality," Econometrica, 71 (1): 355-364]. This method uses both Bhutan's 2005

Population Census and the 2007 household living standard survey (BLSS) to produce reliable poverty estimates at the gewog level. Such a more localized picture of poverty can help reveal pockets of poverty that might otherwise be overlooked. The purpose was effective resource allocation to all the gewogs.

Overall, Bhutan has a rural poverty rate of 30.9%. The rate of urban poverty is much lower at only 1.7%. The highest rates of rural poverty are in Zhemgang, Samtse, Mongar, Lhuentse, and Samdrup Jongkhar Dzongkhags.

The World Bank, NSB, and GNHC staff identified poor school attendance, road infrastructure, rural electrification, and access to markets as conditions correlated with high poverty rates. However, in examining these correlations more closely, Dahlia Colman of the SJI research team found some discrepancy between the geo-referenced poverty data and the overall accessibility index. Thus, for example, the NSB report authors draw a causal relationship between accessibility to markets (calculated with the overall accessibility indicator) and poverty rates. Yet, according to the data, Gasa and some areas of Wangdue and Thimphu Dzongkhags have low market accessibility as well as extremely low poverty headcounts. Further research is required to assess the causes of these deviations from overall patterns. Nevertheless, for Samdrup Jongkhar there does appear to be a direct correlation between low poverty rates and accessibility to markets. Likewise, in areas of Samdrup Jongkhar without rural electrification, rural poverty rates are higher.

The highest poverty rate in Samdrup Jongkhar is in Lauri Gewog, where more than 60% of households are classified as living below the poverty line □ double the rate of Dewathang. More than half of the eleven Samdrup Jongkhar gewogs have a poverty rate of greater than 50%.

But poverty is very different from inequality. Thus, poverty and inequality levels stand in sharp contrast. Dewathang, with the dzongkhag's lowest poverty rate, has the highest rate of income inequality, with Lauri and Pemathang gewogs showing the lowest rates of inequality, as measured by the Gini coefficient, despite much higher rates of poverty.

Consumption

Across the country, 89% of all consumption items were purchased and only about 9% were home-produced. Although only 30% of Bhutan's population resides in urban areas, practically half of the country's consumption purchases were urban. Rural areas accounted for 96% of the home-made items consumed.

The same trend is found in Samdrup Jongkhar, where 89% of the food items consumed in the dzongkhag were purchased. However, most consumed items in Gomdar, Lauri, Martshala, Orong, Serthi, and Wangphu Gewogs were home-made, reflecting their more rural and remote locations. In the urban nuclei of Dewathang Gewog, there was a clear predisposition for purchased items. Consumption in the rest of the gewogs was equally distributed between purchased and home-produced items.

Food (in)security

Food insecurity is a key dimension of poverty. Landlessness and lack of productive assets are the two primary causes of food insecurity in rural areas. Since a key objective of the Samdrup Jongkhar Initiative is to alleviate poverty in ecologically friendly ways, improving access to fertile land and enhancing agricultural productivity in sustainable ways are seen as key potential strategies to reduce food insecurity and poverty in Samdrup Jongkhar.

The PCA (Principal Component Analysis) is a composite index of food insecurity that combines a number of different factors, including household consumption. By this measure, Samdrup Jongkhar presently has an unacceptably high level of food insecurity. Out of the twenty dzongkhags in Bhutan, Samdrup Jongkhar is ranked as the 8th most vulnerable to food insecurity, with a PCA Index of -0.18. The most vulnerable dzongkhag is Zhemgang, with a Mean PCA Index of -0.32, while Thimphu is most food secure with an Index of 0.82. (Source: Vulnerability Analysis and Mapping (VAM) Report, 2005 and RNR Sector 10th FYP).

Although 73.9% of Samdrup Jongkhar households did have sufficient food during 2007, 9.6% reported having had food scarcity for at least two months of the year.

Only 35.3% of households in Samdrup Jongkhar reported having enough food grain production for their own consumption in 2009. Nationwide, the value reached 45.7%. The highest percentage of households reporting enough grain production for their own consumption was in Punakha with 77.7%, and the lowest was in Samtse with 20.2%.

Data on food grain shortages shows that on average 4.8% of Samdrup Jongkhar households had such shortages throughout the year 2009. This is not significantly different from the national average (4.7%). May was the month with the highest rate of such shortages (7.0%) whereas November saw the lowest rate of shortages (2.5%). Sarpang and Samtse had the higher rates of food grain shortages in the country, sometimes exceeding 20%.

The main mechanisms Samdrup Jongkhar households used to cope with food shortages were the sale of non-wood forest products (NWFP) and by-products (79.0%), followed by off-farm activities such as contract work and weaving (64.3%), sale of fruits (61.9%), and cash remittances from employed household members (41.4%).

At the national level, the main mechanisms for dealing with such food grain shortages were sale of potatoes (52.1%), off farm activities (like contract work and weaving) (52.1%), cash remittances from employed household members (46.0%), and sale of fruits (36.2%). (Source: MoA 2009).

The Royal Government of Bhutan (RGOB) is committed to carrying out various programs to alleviate poverty and deprivation, and to achieving the Millennium Development Goals (MDGs). As presented in the 10th Five-Year Plan (FYP), allocating resources to poor gewogs is essential to tackle poverty. The major objective of the 10th

Plan is to reduce the poverty rate to 15%. The strategic objectives identified by the Government for achieving this goal are: revitalizing industry; strengthening national spatial planning; synergizing rural-urban development; expanding strategic infrastructure; investing in human capital; and fostering an enabling environment through good governance. (Source: 10th FYP).

Needs: Potential government actions

In surveys assessing top priority concerns for government action, respondents gave priority to the following areas:

- Road infrastructure and bridges (32.5% of respondents nationwide, 44.3% of respondents in rural areas, 5.1% in urban areas),
- Electrification (25.7% nationwide; 35.1% in rural areas, 3.7% in urban areas), and
- Water supply (23.2% nationwide, 26.6% in rural areas, 15.3% in urban areas).

It is clear from these breakdowns that these issues were of particular concern in rural areas. Urban households considered land and resettlement (28.7%), labour and employment creation (25.4%), and housing (22.3%) as higher priority concerns.

In all of Bhutan, 72% of households had access to electricity in 2007, not surprisingly with a much higher proportion in urban (99%) than in rural (60%) areas. During the 2007 BLSS survey, Samdrup Jongkhar Dzongkhag were more likely to judge electrification as the most important action the government should take compared to any other issue, with 16.7% of Samdrup Jongkhar households expressing this need.

Again, rural-urban breakdowns show dramatic differences, with very few households in Dewathang Gewog expressing the need for electrification, but 55.0% of those in Wangphu Gewog, 43.9% in Gomdar, 34.1% in Serthi, 31.1% in Martshala, and 22.5% in Orong expressing the need for electrification.

The second biggest concern for Samdrup Jongkhar households was land with 16% of households expressing this need. Within the dzongkhag, 50% of households in Langchenphu, 39.5% in Jomotsangkha, 39.1% in Pemathang, 34.3% in Phuntshothang, 32.9% in Samdrupcholing, and 25.5% in Samdrupjongkhar town rated land as a priority for improving their welfare. Across the country, about two in five households are landless four in five urban households, but only one out of every five rural households.

In Samdrup Jongkhar Dzongkhag as a whole, 11.5% of households reported road building needs as a high priority. Not surprisingly, the most remote areas have the highest percentage of households with this concern: Lauri with 32.5%, Orong with 26.4%, Serthi with 21.1%, and Martshala with 18.8%.

Food assistance was rated as a high priority action for government by 16.7% of households in Martshala Gewog. Access to credit was also one of the requirements that households in several gewogs referenced as necessary to improve their welfare. This was especially the case for households in Gomdar (20.0%), Samdrupcholing (16.8%), Lauri (16.4%), and Dewathang (12.2%).

The main concern in Jomotsangkha Dungkhag was resettlement (20.2% of households).15% of households in Lanchenphu Gewog and 11.4% in Phuntshothang expressed concern on the need for irrigation channels.

12.7% of the surveyed households in Samdrup Jongkhar Dzongkhag did not report any of these or other listed needs. Not surprisingly, households reporting no such needs were concentrated in urban areas that have greater access to roads, electricity, water, services, food, and other consumables. Thus 50% of households in Dewathang town and 34.4% in Samdrup Jongkhar town did not report any such needs.

ECOLOGICAL RESOURCES

Climate

Samdrup Jongkhar Dzongkhag lies in the subtropical belt and experiences hot summers with average temperatures reaching up to 35°C during the months of June, July, and August, and dropping to cooler temperatures of 16°C in winters. The dry season extends from October to March, and most of the precipitation is observed from April to September with the heaviest rainfall occurring from June to September. The dzongkhag receives an average annual rainfall of 5,309.4 mm (http://www.samdrupjongkhar.gov.bt). The annual average humidity is 7%. The region has the warmest weather and most rainfall in the country.

Surface Water

There are four major rivers in Samdrup Jongkhar. The Jomo Chu flows from Trashigang through the eastern part of Samdrup Jongkhar into India. The Nonori flows through Serthi and Samrang Gewogs. The Deu Chu flows through Orong Gewog. And the Nyera Ama Chu flows through Gomdar, Wangphu, Martshala, Pemathang, and Phuntshothang Gewogs. The most arable land is in Pemathang, Phuntshothang, Samrang, Langchenphu, Dewathang, Gomdar, and Orong Gewogs. Some of these lands were damaged by floods during the monsoon in 2000 (source: DoP[5], 2003).

Groundwater

Ground water resources in Samdrup Jongkhar are abundant with springs emerging from basement rocks, old landslides, and fluvial deposits. Groundwater in landslide and alluvial deposits has been estimated at an exploitable rate of 3 litres/second/km^2 (source: ADB, 2004).

Currently systematic water quality monitoring of Bhutan's water resources has only been conducted in Bhutan's four major river systems, and there is need to undertake such monitoring in Samdrup Jongkhar. The state of Bhutan's water resources is thought generally to be still good. However due to expanding settlements along rivers, localized

[5] DoP refers to the former Department of Power, which was under the Ministry of Trade and Industry. DoP was restructured and bifurcated into the Department of Energy (DoE), Bhutan Power Corporation (BPC), and Bhutan Electricity Authority (BEA) in July 2002.

pollution problems are emerging due to unsanitary conditions and waste disposal along river banks both in urban and rural areas.

Air Quality
Please see the section in the main Samdrup Jongkhar Profile report on transboundary air pollution and the likely effect of the "Asian Brown Cloud" on Samdrup Jongkhar and Bhutan's southern districts.

Urban air pollution, however, is a recent phenomenon in Bhutan and can be attributed to rapid urbanization and growing motorized vehicle use. Diesel vehicles with poor fuel quality are major sources of urban pollution. There is no available information on air quality for Samdrup Jongkhar because, up to now, air quality (PM, NO^2 and SO^2) monitoring has only been conducted in Thimphu and Phuentsholing. The average respirable particulate matter (PM_{10}) concentration is 24.5 µg/m3 in Thimphu (source: NEC). This rate is lower than the internationally set PM_{10} acceptable concentration level of 40 µg/m32.

Since Samdrup Jongkhar has a much lower population, less construction and industrial activity, and far fewer vehicles than Thimphu, the air quality is expected to be much better than the one recorded in Thimphu. (Source: World Health Organization, 2000).

In rural areas, however, the use of firewood for cooking and kerosene lamps has been associated with health problems such as eye irritation and respiration issues. The use of electricity can help reduce in-house air pollution originating from the use of Bhukhari stoves and fuel wood.

Protected Areas
Bhutan is among the top 10% of countries ranked as having the highest species density (number of species per unit area) in the world, and has the highest proportion of forest cover (72%) and protected areas (51%) in Asia (source: MoA, 2002). According to reports, there are around 5,500 species of vascular plants, over 770 species of birds, and 165 species of mammals, with many being endemic to Bhutan. This rich biodiversity is due to the remote nature, geographical relief, and climatic heterogeneity of the country.

The protected area system was initiated in the 1960s and has been periodically revised and expanded. There are now nine protected areas covering 51% of the country's land area. There are five National Parks in Bhutan, four Wildlife Sanctuaries and one Strict Nature Reserve.

The only protected area in Samdrup Jongkhar is a part of the Khaling Wildlife Sanctuary. It has an area of 273 km^2 and is expected to form a transfrontier reserve with the adjoining Indian reserve in Assam. At present, the Sanctuary has still not been created, has no management plan in place, and no surveys have been conducted so far.

The only biological corridor present in Samdrup Jongkhar is the one connecting Merak Sakteng Wildlife Sanctuary (SWS) in Trashigang Dzongkhag to the Khaling Wildlife

Sanctuary. Sakteng Wildlife Sanctuary was established in April 2003. The total area of that sanctuary is 740.6 sq km covering Merak and Sakteng Gewog under Trashigang Dzongkhag and part of Lauri Gewog under Samdrup Jongkhar Dzongkhag. Highlanders living in the park area are semi-nomadic and use large areas as grazing land for their cattle.

The floral diversity of SWS comprises a wide range of ecosystems including different forest types within an altitude ranging from 1,600 to 4,500 m. The forest contains 203 tree species including herbs, shrubs, and small trees. The Sanctuary is also famous for faunal diversity and contains 18 species of mammals and 147 species of birds.

Forests

Aside from the vital ecosystem services they provide, Bhutan's forests have also always played an important role in the socio-economic development of the country. They are an integral part of farming systems and are linked to agriculture and livestock development. Forests provide food, medicines, energy, shelter, animal fodder, organic fertilisers, and a wide range of other resources. Free access to such natural resources, especially for rural people, has effectively helped protect against situations of extreme poverty, destitution, and homelessness. In Samdrup Jongkhar, for example, marketing of non-wood forest products is the primary means to guard against food grain shortages, as noted above.

Forests are also vital to maintain water catchments which support agriculture, the main source of livelihood for the people of Bhutan, and the hydropower sector, which is the largest single source of national revenue increase.

In Samdrup Jongkhar, 77.3% of the land area is under forest cover, comprised mainly of broadleaf forest (72%), with the remaining 28% consisting of conifer, scrub, and forest plantation. The Division Forest Office was established in 1971. It has a large jurisdiction covering an area of 230,837 ha.

Samdrup Jongkhar has 39.1 million m^3 growing stock of forest, and its annual yield is estimated to be 317,000 tonnes. There are four Forestry Range Offices and five Forestry Beat Offices.

The total number of community forests in Samdrup Jongkhar is 22, with 497 community forest management groups (7.23% of the number in the country as a whole), occupying a total area of 1,536 ha (amounting to 9% of the total area in Bhutan that is dedicated to community forests). (Source: Social Forestry Division, Department of Forests, 2009).

Non-Wood Forest Products (NWFP)

Bhutan has over 300 plant species traditionally used in preparing indigenous medicine. In the past, medicinal plants, such as Manjito (Rubia cordifolia), Chirata (Swertia chirayita), Pipla (Piper nigrum and Piper longum), Sarpagandah or Nakbhel (Rauvolfia serpentina) and Putishing/Kutki (Picorrhiza kurroa), among others, were sold to India. The highest bidder was given full access and jurisdiction over seasonal collection in a specific area.

The Royal Government of Bhutan realized that in the long run, however, such nonscientific harvesting of plant species would bring more harm than revenue. Hence the general ban on the unregulated export of medicinal plants imposed in the early 1980s remains valid to date, and harvesting and sales are now strictly regulated.

In Bhutan as a whole, a number of medicinal plant species have international market value. Among these are Agarwood (Aquilaria agallocha), Rauvolfia Serpentina, Tshe (Ephedra gerardina), Himalayan Yew (Taxus Baccata), Chutsa (Rheum Nobile), Chumtsa (Rheum Accuminita), Kutki/Putishing (Picorrhiza Kurroa), Pangpoi (Nardostachys Jtamansi), Tsenduk Rig (Aconitum spp.), and Yartsa-Gunbu (Cordyceps Sinensis). All are in high demand for pharmaceuticals.

A renewed interest in traditional medicine in Asia, and the introduction of health foods in Europe and North America, have provided new outlets for many botanical products. Over 400 botanicals are used commercially in Western Europe, with Hamburg as the centre for the trade. Of the Western nations, the United States is the major importer of medicinal plants. Japan is the major importer among Asian countries.
(Source: Raling Nawang, Project Manager, Integrated Forest Management Project)

In Samdrup Jongkhar, 1,455 ha (94.73%) of the community forest area is dedicated to NWFP. Please see the main Samdrup Jonkghar Profile report for detailed descriptions of the availability and harvesting of Manjito (Rubia cordifolia) and Chirata (Swertia chirayita) in Samdrup Jongkhar, with the latter of particular importance in remote Lauri Gewog. (Source: Social Forestry Division, Department of Forests, 2009).

Potential markets of NWFP
Work in recent years has led to the discovery of potential interested buyers of products that grow in Samdrup Jongkhar Dzongkhag. The most important challenge seems to be the need for good management of the resources, the establishment of well-run cooperatives, and effective marketing. Several agencies, such as South-South Cooperation, SNV, Helvetas, and UNDP, have been working on these aspects of NWFP in Bhutan.

This list shows the most important NWFP products in Samdrup Jongkhar:

Singkhar Lauri is known to have a rich variety of medicinal herbs. The three most interesting herbs in Samdrup Jongkhar in terms of potential commercialization are Chirata (Swertia chirayita), Rubia cordifolia and Illicum griffithii. Community-based approaches to forestry and natural resource management have been promoted in order to strengthen the link between protecting valuable natural resources and developing rural communities.

There are a number of groups formed in Samdrup Jongkhar for harvesting and marketing NWFPs. The most important one is the Community Forestry group in Lauri Gewog (it includes all villages) focused on managing and marketing Chirata (Swertia chirayita), an

important medicinal plant. There are two other NWFP groups formed in Martshala Gewog focused on management and marketing of Rubia cordifolia (mostly used as dye).

Chirata (Swertia chirayita)
According to the "Flora of Bhutan," 19 different species of Swertia are found in the country. The most commercially valued species with high demand in the international market is Swertia Chirayita. In Bhutan, the gewog where it grows most abundantly is Singkhar Lauri in Samdrup Jongkhar Dzongkhag.

Swertia Chirayita is one of the most important medicinal plants found in Bhutan. The plant is well known for its very bitter taste and its medicinal value. All parts of the plant, including leaves, flowers, roots, and stems, are used. Chirata is used for numerous purposes, including reducing fever, burning of the body, and pain in the joints. It helps to get rid of intestinal worms and skin diseases, and is used to ease constipation, urinary discharges, ulcers, stomach aches, asthma, bronchitis, and leucorrhoea. It is also used as a breath refresher and to reduce vomiting during pregnancy. Traditional Bhutanese medicine also uses Chirata for blood purification and to cure the common cold, gout disease, and even diabetes and malaria.

The plant grows at an altitude between 1,900 and 3,000 meters and it can be found adjacent to different villages, especially in former shifting cultivation areas. Farmers collect the entire Chirata plant during the months of December-January.

The existing populations of Chirata are reported to be diminishing. Within Lauri Gewog, farmers claimed that it was possible to collect at least 20 metric tonnes in the year 2000, while the harvest is now less than 5 metric tonnes.

The medicinal herb is sold in dried bundles in local markets. In 2007, almost 42% of the households in Singkhar Lauri depended on Chirata as a source of income. In 2007, a total of 9,400 kg of Swertia chirata, with a value of Nu 923,000, was harvested and sold by the community of Shingkhar Lauri.

Farmers used to sell their produce to the Food Corporation of Bhutan (FCB). Today however, the produce goes mainly to Bhutanese or Indian middlemen who take it to markets in Delhi or Calcutta. According to the main Indian shop keepers in Daifam, the Chirata from Singkhar Lauri is very good in terms of purity (based on bitterness), but is poor in colour and appearance, compared to the Chirata from Nepal. The colour is due to the crude drying and packaging process. New solar driers developed by the Samdrup Jongkhar Initiative in collaboration with the Jigme Namgyel Polytechnic have potential for significant improvements in drying that may overcome some of these problems in the future.

Good quality Chirata is reddish brown in colour (not black), very bitter in taste (with taste also used to differentiate among species), well air-dried (100% on air dry basis), and not infected by fungi (mycelium growth).

Farmers can lose about 30% of their products between the time of harvesting and selling because of improper management of drying, packaging, and storage. In 1999, the first solar drying unit for Chirata was provided for Zangthi village by a small UNDP funded project. The drying unit was handed over to the community but no one was given clear responsibility for its maintenance. The unit is not functioning anymore. Again, the Samdrup Jongkhar Initiative's current solar drying project intends to overcome these past deficiencies by including a strong training component in its implementation procedures.

Prices of Chirata decreased sharply between the year 2000 (Nu. 200 per kg) and 2005 (Nu. 45 per kg) due to the collapse of the auctioning system in Daifam and poor quality control. This led to adulteration of the product as it was mixed with other weeds, sprayed with water to increase the weight, mixed with stones, etc. In 2006, however, once the middlemen became aware of the on-going process of community group formation, the prices for the product almost doubled and reached Nu. 110 per kg. Efforts in preparing a management plan to be implemented by the communities have been made and will hopefully improve the sustainability of the Chirata resource and market. (Source: Forest Resources Development, MoA, 2008, and Dzongkhag Forestry Service, Samdrup Jongkhar, 2007).

Rubia cordifolia
Rubia cordifolia (Tsoe in Dzongkha) is a species of flowering plant in the coffee family growing at up to 3,750 m. It can grow to 1.5 m in height. It is cultivated to generate a red pigment that is derived from the roots. The plant is also a constituent of many Ayurvedic drugs like septilin (rhinosinal infections), rumalaya, and herbinol. Roots are credited with tonic, astringent, anti-dysenteric, antiseptic, and deobstruent properties. Roots are used in rheumatism and also form an ingredient of several Ayurvedic preparations. Roots are said to be active against taphylococcus aureus and are made into a paste for application to ulcers, inflammations, and skin troubles. Roots are used also for colouring medicinal oils. A decoction of leaves and stems is used as a vermifuge.

In 2007, a total of 24,300 kg of Rubia cordifolia with a value of Nu 368,100 was harvested and sold by the community of Shingkhar Lauri. The production in Martshala Gewog in Samdrup Jongkhar was 5,024 kg. with a value of Nu. 75,360.

Illicum griffithii (star-shaped anise)
Illicium griffithii grows in subtropical and wet temperate broad-leafed forest and in different sparse places in Bhutan. It is usually found within the average elevation range of 1,200 to 2,670 m. The appropriate period to harvest to collect the fruits ranges from the end of October till December. This assures that the collected fruits are seedless. The shape of the fruit is like star with a radiating boat shaped seedpod.

The use of this medicinal plant is broad and invites potential markets. The fruits and seeds are used medicinally while preparing local liquor (ara), or are used for the sweet fragrance in suja (butter salted tea) or ngaja (sugar tea). Dried seedless fruits are used as incense. Seedless fruits are used to cure cough, toothache, and sinusitis (through inhaling the vapour by boiling the fruits in water). The fruits are also used as an aromatic

stimulant (refreshment or tonic) and for carminative (relieving flatulence) purposes. However, moderation and care in consumption are required as an overdose of the fruit causes serious vomiting and may even risk one's life. (Source: Social Forestry Division, Department of Forests, 2006).

A recent study suggests that the essential oil isolated from Illicium griffithii can effectively be used as an antifungal agent and as a food preservative. (Source: A. Saraswathy, et al., 2010). Shikimic acid, one of the main components of Tamiflu (the drug used against bird flu), is found in Illicium griffithii seeds.

Illicium griffithii is considered one of the most valuable tree species among many important species of NWFP. Earnings from the sale of this species of fruit therefore has the potential to increase the annual household income of the poor. As of now, the collection of fruits for trade has no negative impacts or serious adverse effects on the environment or wild resources. However, for the future sustainability of this species, it is necessary to have proper management guidelines for the harvesting and marketing of these fruits.

Illicium fruits from Bhutan presently have only a regional market. In a good fruiting year up to 1,004 kg / ha can be harvested and in a bad fruiting year a total of 251 kg / ha can be harvested.

The trade for this fruit was introduced to Bhutan as early as the 1970s, at which time the commercial value was only Nu.12 per kg at Bomdila, Arunachal Pradesh, India. In 1995, the market value for the fruits in Samdrup Jongkhar Dzongkhag was Nu.180 per kg. But in 2003, the market value of the fruits dropped sharply to Nu.45-55 per kg., due to the fact that the collectors could not sell directly to the end market but rather sold to the Indian businessmen (middlemen) stationed in Samdrup Jongkhar. The selling price of Illicium griffithii fruits today is about Rs.110-120 per kg at the market of Tezpur, India.

In 2007, a total of 3,000 kg of Illicium griffithii with a value of Nu 75,000 was sold by the community of Shingkhar Lauri. In 2006, around 5% of the households in Singkhar Lauri depended on Illicium griffithii as a source of income.

Agarwood

Agarwood is a dark resinous heartwood that forms in Aquilaria and Gyrinops trees when they become infected with a type of fungus. A dark aromatic resin is produced in response to the attack, which results in a very dense, dark, resin embedded heartwood. The resin embedded wood is valued in many cultures (from Saudi royalty to Bhutanese monks) for its distinctive fragrance, and is used for incense and perfumes.

Agarwood is still very sparsely found in Bhutan's forests, though now it is considerably less abundant than it once was, and is almost at the point of extinction. Despite the Forest Department's vigilance, many trees have fallen to the poacher's axe. Smugglers sneak across the border, cut down the trees, and drag them back to India.

A kilogramme of the infected tree's chip may cost about Nu. 8,400, with better grades fetching up to Nu. 450,000 per kg. The cheapest Aoud oil, distilled from agarwood, can cost about Nu. 900 per kg, while the finest Oud oils distilled from agarwood can cost as much as Nu. 315,000 per kg. In Bhutan, the National Institute of Traditional Medicine (ITMS) in Thimphu is the only organization that currently buys agarwood for medicinal use. It costs about Nu. 60 for a kilogram without the infection. On an average, ITMS uses 250-300 kg of agarwood (white wood) annually. ITMS usually buys agarwood on a standing tree basis (dry weight) considering their requirements and reserve stocks. According to the Traditional Medicine Institute, four to five trees were used in total in 2009.

Agarwood is used in medicine and in the production of incense. According to a study that was recently carried out by Dimple Thapa, a masters student in Austria, incense factory owners are willing to manufacture agarwood incense if agarwood is available in the market. But the Forest Act has prohibited its commercial harvest due to the decrease in numbers, and more trees are now being planted under the social forestry program of the Forestry Department. However, one of the objectives of the study in Austria is to promote the legalization of agarwood harvesting from plantations.

Agarwood is not presently being exploited commercially. Because of its high market value, however, a few trial plantations were established in Panbang and Samdrup Jongkhar in the 1980s. These trial plantations have been successful in terms of growth. Although an Agar inoculation study was carried out in Panbang and Gelephu by Prof. Blanchette from the University of Minnesota between 2001 and 2004, efforts to inoculate the trees with infected branches have not been encouraging. Without the inoculation, the trees as such have no commercial value. Most of the trial plantations are quite small in size and still very young (<10 years old) as of now. Only the Panbang ones are mature. A few people also have a few mature trees in their homestead gardens as well. ITMS is buying its stock from these private gardens. In Samdrup Jongkhar, there is an agarwood plantation in Bhangtar and there are a few agarwood trees in Silingay, outside the District Forestry Officer's office. (Source: Kuensel, 2010, and personal communications).

Other potential medicinal plants

Lemon grass (Cymbopogon flexousus) is one of the most important essential oil bearing plants found in Bhutan. Trashigang and Mongar districts have large areas under lemon grass production. The essential oil companies buy lemon grass collected from the wild areas at the roadside for their distillation units. Bio Bhutan is one of the main buyers of lemon grass. Its products (all organically certified) are sold all over the country and on a small scale internationally in Europe. The value of lemon grass oil is 600 Nu./kg.

Medical cannabis (also referred to as medical marijuana) has long being used in herbal therapy, with evidence dating back to 2737 BC. Despite the opposition to research and use by many governments, the list of well-documented beneficial effects is long: treatment of nausea, vomiting, premenstrual syndrome, unintentional weight loss, insomnia, lack of appetite, spasticity, neurogenic pain, movement disorders, asthma, glaucoma, inflammatory bowel disease, migraines, fibromyalgia, relief of certain

symptoms of multiple sclerosis and spinal cord injuries, treatment of alcohol abuse, collagen-induced arthritis, atherosclerosis, bipolar disorder, colorectal cancer, depression, and many more ailments. Medicinal use of cannabis is legal in a number of countries, including Belgium, Canada, the Netherlands, Israel, Spain, Italy, and some states of the United States.

Another use of cannabis is in hemp from which a common product is fibre for use in a variety of different forms, such as clothes. Hemp seed and fibre are legally recognized products. Fuel is often another by-product of hemp cultivation.

Illegal smuggling of marijuana across the border is common in Samdrup Jongkhar. In Serthi Gewog, the plants are randomly seeded in the wild or cultivated among other crops in the fields, and the leaves are then sold at the border town Jomotsangkha. A kilogram of dried leaves fetches between 700 and 1000 Nu. The activity is a consequence of poverty (source: *Bhutan Times*). It has been suggested that a suitable strategy might be to control its cultivation and sell the product as a medicinal herb or make use of the hemp to make clothes and other materials.

Ipacac (Cephalus ipacacaunha) and Dioscorea deltoides are cultivated on large plantations in India just across the Bhutanese border. Proceeds from these plantations reportedly amount to over 10 million rupees per annum. Similar plantations are quite possible within Bhutan. Further research in this area is needed to understand the potential cultivation of these and other medicinal herbs in Bhutan.

Bamboo

Bamboo grows naturally in Bhutan because of the country's largely undisturbed forests and the limited agriculture practice in areas where bamboo proliferates. Bhutan has 15 genera and 31 species of bamboo. Possibly as many as 50 more species exist, but have yet to be identified. The Kingdom probably has the greatest variety of bamboo species of all the Himalayan countries. Bamboo has long been used by the Bhutanese people in a variety of ways. A few of its major uses are in construction and scaffolding, roofs and walls of houses, containers, irrigation channels, split and woven mats, crafts, arrows, and even clothes.

Different types of bamboo are present in Samdrup Jongkhar and are regarded as potentially marketable in various forms. Tsharzo Gongphel Tshogpa, a bamboo products cooperative in Bjoka in Zhemgang Dzongkhag may provide an excellent model for introduction of a bamboo market in Samdrup Jongkhar. The cooperative has enabled people to directly market their products in Zhemgang town without depending on the middlemen who in the past sold their products and took a large portion of the profit. That Zhemgang initiative is benefiting 120 households. The cooperative was established with assistance from UNDP and SNV.

Bio Bhutan is the main provider of organically certified products from Bhutan and can also be seen as a significant potential model for building an organic market for Samdrup Jongkhar products, especially NWFP. Bio Bhutan's goal is to improve income and

employment opportunities for rural communities as well as to promote the image of Bhutan as a producer of pure and natural products. Bio Bhutan is currently working with 19 farmers' groups in 8 dzongkhags: Mongar, Trashigang, Trashiyangtse, Lhuentse, Chhukha, Tsirang, Sarpang, and Gelephu. Bio Bhutan is also in close collaboration with several community forests, women groups, and honey producers. As the Samdrup Jongkhar Initiative develops, Bio Bhutan may be a natural partner, outlet, and potential ally in helping to market the region's products.
Bio Bhutan's market products are various. Lemon grass oil based products are obtained from 41 distillers in Mongar and Trashigang districts. Cordyceps are collected in Paro, Wangdi (Sephu), Gasa, and Bumthang. Dried and powdered ginger are purchased from the Dekiling Ginger Group in Sarpang. Turmeric is produced by women's groups under the National Women Association of Bhutan (NWAB) in Zhemgang. Honey comes from 45 households in Lalikharka and Gopini villages in Dunglagang Gewog under Tsirang district. Herbal teas containing Ruta, lemon grass, Pipla and Amla are also commercialized.

Bio Bhutan's products are sold in Bhutan, India, USA, Singapore, Thailand, and Europe. Once the products are collected, the packaging is done in Thimphu or in India (in case of tea bags). Promotion of the products is made through the website http://www.biobhutan.com and through advertisements in local media.

Bio Bhutan does have aspirations to expand to new products like Chirata, which are collected in Samdrup Jongkhar. Since at times the current resources and sources of supply are not enough to meet Bio Bhutan's needs and product demand, Ugyen (Bio Bhutan director) has expressed interested in buying herbs from Samdrup Jongkhar.

Bio Bhutan's organic products are certified and annually inspected by the Indian agency ADITI Organics (http://www.aditicert.net) and accredited by India's National Programme for Organic Production Standards. The certification is equivalent to the European Council Regulation 834/2007. This allows the products to be sold on a small scale in several European countries.

The National Organic Program (NOP) is also working on creating a Bhutanese organic certification system, perhaps using the Participatory Guarantee System (PGS) that is promoted by the Organic Farming Association of India (OFAI) and has proved highly successful there. Three OFAI trainers, including developers of the PGS system, spent two weeks in Samdrup Jongkhar in February-March 2011 at the invitation of the Samdrup Jongkhar Initiative, explained PGS to local farmers and agriculture officials, and trained local farmers in the basics of cooperative formation and organization.

ITMS (Institute of Traditional Medicine Services) is the most important agency in Bhutan interested in purchasing NWFP. In an interview, Pema (ITMS director of marketing) showed interest in purchasing NWFP from Samdrup Jongkhar if sufficient supplies are available, but he noted that often the actual providers do not have enough capacity to furnish the amount needed. In the future, the Samdrup Jongkhar Initiative may be able to play a useful role in forging links between suppliers and buyers like ITMS in such a way

as to meet the needs of both. Presently, the main products of interest to ITMS are agarwood and Chirata, though there is also considerable for potential for other medicinal herbs found in Samdrup Jongkhar.

Wildlife

A wide variety of fauna inhabits the forested areas of Samdrup Jongkhar. Some of the protected species are the Asian Elephant, Leopard, Leopard Cat, and Himalayan Black Bear. Common wildlife species in the area include macaques, leopards, bears, wild dogs, wild pigs, barking deer, and sambar. Sambar, barking deer, wild pigs, and wild dogs often damage crops or attack the cattle in the district.

Human-Wildlife Conflict (HWC) □ a major challenge in Samdrup Jongkhar □ occurs when the needs of wildlife overlap with those of human populations, creating costs to residents and wild animals. HWC is today perceived as the major cause of poverty in rural Bhutan and one the most important factors driving rural-urban migration. Crop damage by wild animals has resulted in farmers stopping cultivation of particular crops altogether, or moving to other parts of the country in search of non-farming work. In the mid-1990s, due to crop damage, 23% of farmers in Zhemgang stopped growing rice, while 39% abandoned dry land agriculture and 71% stopped slash and burn agriculture. In Tomiyangtse, eastern Tashiyangtse, 14% of the work force emigrated in search of non-farming work.

National data from 2008 show that 55.7% of rural households nationwide reported being adversely affected by wildlife. Maize accounts for the largest proportion (69.4%) of the total cereal grains destroyed by wildlife, while paddy accounts for 27.4%.

Wild boar were responsible for destroying the major proportion (63.3%) of cereal grains. In general, about 6.2% of the cereal cultivated in Bhutan has been estimated to be affected by wildlife on an annual basis, with a corresponding production loss of 3.3%. An estimated 1.8% of the potato cultivated area was damaged by wildlife in 2008, resulting in a 1.3% loss of potato crops (source: RNR census 2009).

In Samdrup Jongkhar, 58.6% of households (compared to 55.7% nationwide) had their crops affected by wildlife and 2.4% (compared to 4.5% nationwide) reported they had lost livestock to predators in 2008. The data show that 2.0% of the households lost cattle; 1.4% lost poultry; and 0.3% lost goats, horses or pigs.
Wildlife problems were the key reason to leave their land fallow for 34.5% of Samdrup Jongkhar households in 2008. The crops most affected by wildlife in Samdrup Jongkhar were maize (69.8% of total cereal production lost to wildlife) and paddy (29.9%). In Samdrup Jongkhar, as nationwide, the most important culprits are wild boar (responsible for 68.3% of losses), followed by monkeys (18.4%), elephants (7.5%) and sambhar (5.0%). Bears and birds are responsible for less than 0.5% of crop losses. These proportions are similar for the whole country.

Farmers told Samdrup Jongkhar Initiative researchers that there was a population explosion of wild pigs after their natural predators, wild dogs, were poisoned in the 1980s

because they were attacking livestock. Wild pigs are now the species most responsible for crop damage in Bhutan.

Although killing of wildlife was prohibited by the Forest Conservation Act in 1995, pressure from affected farmers has permitted a change in the law. It is now legal to kill wildlife intruders within the farmer's field limits. Endangered species (such as elephants) are an exception and remain protected. If a farmer is caught killing a wild animal outside her/his own field, (s)he will be charged with a high fine.

Many studies have been undertaken in an effort to understand human-wildlife conflict better and to seek effective solutions. Several measures respecting nature, such as the use of chili powder to deter elephants, fake bee hives, and electric fences that are safe for humans and domestic animals (under development at the College of Science and Technology), are being tested.

About 438 sets of both solar and electric powered wildlife repellent devices have been installed in 10 dzongkhags. There are further plans to install about 525 sets of alarm devices as well. Although the first solar fencing in 2003 really benefited many local residents in Samdrup Jongkhar, especially in providing protection against wild elephants, various problems have been reported by farmers regarding solar fences.

For example, energizers (batteries) are down, and wires were damaged or stolen especially during the insurgency. When new equipment is provided, it often breaks and no one comes to repair it, while the farmers themselves have not been trained in maintenance and repair of the equipment. Learning from some of these past difficulties and challenges, the Samdrup Jongkhar Initiative may be able to make a contribution in deepening farmers' sense of ownership, responsibility, and capacity to maintain such equipment.

A recently developed online data base enables tracking of when and where wildlife attacks against crops and livestock take place. The system permits making decisions faster and easier. (Source: Kuensel and personal communication). Pema Dakpa, head of the National Post-Harvest Centre in Paro, is currently working on a new light and sound device to scare wild animals. This device is presently being tested in Samdrup Jongkhar with 37 devices so far installed. The District Agriculture Officer is supervising the pilot experiment. Improvements of the device such as converting it into a wireless operated mechanism are being studied in order to cover an entire field area with sensors.

At the present time, fields are usually physically guarded in turns by women as the main method for fending off wildlife predation. Monkeys and porcupines come during the day and wild boar at night. In some cases, the whole family stays in the sha-fai (guard house) all night watching for wild animals. The scare methods used by these guards generally consists of shouting and banging old steel utensils and tins bound on poles in different areas in the fields. Other attempts have consisted in clearing bushes around the fields, erecting numerous scarecrow-like objects, and building fencing using the best material available. However, such efforts have generally not been effective. .

A pilot insurance scheme to cover losses of livestock killed by predators and of crops destroyed by wildlife has been initiated. As a result, the cases of wildlife predation actually reported to the Wildlife Conservation Division (WCD) increased sharply from four cases in 2002 to 113 in 2003. In 2004, the number of cases increased five fold (609). This sharp increase is likely due both to the initiation of compensation programs and increased awareness.
Between 2003 and 2005, the WCD compensated about Nu 4.3M to farmers for losses incurred. However, since its funds fell short, the division scaled back its compensation programmes, and compensated only for loss of livestock to tigers and snow leopards. It cost the WCD Nu 178,750 for livestock lost between 2006 and 2008. Today, since the tiger is at the top of the food chain, only animals killed by tigers are compensated, with the compensation amount ranging from Nu 500 to Nu 9,500 depending on circumstances.

Evidence from other jurisdictions reveals that high rates for compensation are not always beneficial. In Switzerland, for example, farmers stopped looking after their sheep because the compensation for sheep killed by wolves was very high. In order to manage the claims more objectively and avoid swindles, the system in Bhutan is now being decentralized, and power to make decisions on compensation has been given to the farmer communities (source: RSPN, personal communication).

AGRICULTURE AND INDUSTRY

One of the strategies adopted by the 10th Five-Year Plan (FYP) is to diversify the economic base of the renewable natural resource (RNR) sector through the promotion of the high value niche markets of organic products and agro- and eco-tourism initiatives.

Agriculture

The Samdrup Jongkhar Initiative aims to raise living standards in accord with Bhutan's treasured GNH values, principles, and development philosophy. As the Samdrup Jongkhar economy is based overwhelmingly on subsistence agriculture, a key component of the initiative will therefore focus on improving both the economic viability and environmental sustainability of agricultural production harmoniously and simultaneously. This is further hoped to increase economic opportunities in agriculture for educated young Samdrup Jongkhar residents, and thus to help stem the present tide of rural-urban migration.

Bhutan being largely agrarian, agriculture is the main source of livelihood for the people. Its contribution to national GDP was 9.1% in 2008 (source: NSB 2009) and accounted for 78.6% of the monetary income of rural households in 2008 (source: RNR Census 2009).

The agricultural production system encompasses both cereal and horticulture crops. The cereals are cultivated mostly on wet and dry land while horticulture (consisting of vegetables, pulses, spices, oilseeds, and fruits) is produced exclusively on dry land.

Wetlands are terraced fields traditionally irrigated and used mainly for paddy cultivation,

although cultivation of complementary crops such as wheat and some vegetables is not uncommon in some of the farms located close to the urban centers. Dry lands are characterized by steeper slopes and mostly occur where the scope for irrigation is poor. This category of land is primarily used for growing food crops such as maize, wheat, buckwheat, millet, and horticulture crops. Another important category of land is "orchard" (or "cash crop land") and is exclusively used for fruit production.

The area suitable for agricultural production is severely limited by the steep and rugged terrain, altitude, high priority given to maintaining forest cover (presently at 80% and Constitutionally mandated always to remain at least at 60%), and losses of agricultural area to urbanization and other developmental activities. (source: RNR Census 2009).

Analyses of the RNR census 2009 revealed that nationwide, of the total agricultural land holdings of 94,903 hectares:

- wetland accounted for 20.6% (19,523 hectares) owned by 51.8% of allrural households,
- dry land accounted for 69.2% (65,665 hectares) owned by 86% of all rural households, and
- orchards accounted for 10.2% (9,714 hectares) owned by 17.4% of all rural households.

Land holdings are fairly evenly distributed in the country, but highly fragmented with small parcels of land in different locations:

- The majority (54.3%) of rural households owned less than or up to 3 acres (1.2 hectares) each,
- 39% of rural households owned between 3 and 10 acres (1.21 – 4 hectares) each, and
- 6.9% of rural households owned more than 10 acres (4.01 hectares) each of agricultural land.

On average, rural households in Bhutan own about 4 acres (1.6 hectares) of agricultural land. Landless rural households were recorded at just 1.1% of all households, sporadically distributed across all 20 districts.

- 59.2% of all rural households cultivated their own land in 2008,
- 7.3% of rural households had leased out,
- 10.4% had leased in, and
- 23% of rural households had left their land fallow in 2008.

The National Land Commission (NLC) is currently re-doing its nationwide cadastral survey and verification of agricultural land holdings. At the same time, land kidu (welfare grant) is being granted for the landless farmers in the country. It is expected that the agricultural area size estimates noted above will increase once these two exercises are completed.

Agriculture makes up 18.2% of the total land cover in the Samdrup Jongkhar Dzongkhag,

4% of land cover consists of water spreads, rocky areas, and landslips, and only 0.12% is under settlement.

The total land area under agriculture in Samdrup Jongkhar is 12,519 acres. This includes 734 acres of wetland (5.8% of all agricultural land)), 10,933 acres of dry land (87.3%), 569 acres under pangshing (grass fallow) (4.5%), 265 acres as orchards (2.1%), and 17 acres of kitchen gardens (0.1%). Shifting cultivation or Tseri (slash and burn bush fallow), Pangshing (grass fallow), and pastureland (Tsamdrog), are the primary agricultural land uses in the Wet Subtropical Zone. (Source: RNR Sector 10th FYP).

In Samdrup Jongkhar and the adjacent southern region, 53% of wetlands are presently under paddy production, while 26% of wetlands are left fallow or dedicated to other crops. Paddy productivity is particularly low in Samdrup Jongkhar (5,900 mT, 910 kg/acre), with yields normally increasing with water availability.

Though millet (1,380 mT) and maize (17,041 mT) production is also popular on wetlands, vegetable production (2,164 mT) is very limited and is primarily for household consumption. The mid-2012 nationwide "rupee crunch" in Bhutan, and the government's new emphasis on increasing domestic vegetable production to avoid rupee outflow for vegetable imports, will likely change this situation quickly and sharply expand vegetable production.
Agricultural production in Samdrup Jongkhar accounted for 83.1% of the monetary income of rural households in 2008 (source: RNR census 2009). In Samdrup Jongkhar 98.2% of rural households own land. 33.1% own wetland, 86.5% own dry land, and 23.87% own orchards.

26.7% of Samdrup Jongkhar's rural households owned between 3 and 5 acres of land in 2008, 23.5% between 1 and 3 acres, 23.6% between 5 and 10 acres, 18.3% less than one acre, and 7.8% more than 10 acres.

At least 58% of the households had cultivated their own land; 5.8% of the households had leased out, 9.6% had leased in, and 26.6% of rural households had left their land fallow in 2008.

The two main reasons respondents gave for leaving land fallow in Samdrup Jongkhar were the far location of the field (36% of households) and wildlife problems (34.5%). Other reasons were unproductiveness of the land (12.4%), lack of irrigation (7%), and land too steep for cultivation (6.4%).

According to a study conducted by the agriculture research centre in Wengkhar in Mongar Dzongkhag in 2009, around 51% of the total rice consumption in 50 of the 69 gewogs in the six eastern dzongkhags is imported. Out of 8,883 acres of wetland in the six dzongkhags, around 1,192 acres have been laid fallow in the past ten years.

If current trends continue, the study forecast, Bhutan would have no wetland in seven decades. Among the six eastern dzongkhags, Samdrup Jongkhar had the highest wetland

fallowing rate of 342 acres in 10 years. Across the eastern dzongkhags, fallowing of wetland has doubled in the last 10 years and is likely to continue; 44% of those interviewed in the Wengkhar study believe that the trend will continue while 21% fear it will increase.

According to the study, fallowing of wetland in the eastern dzongkhags is due to five major factors related to social, technical, economic policy, and environmental conditions. Social factors include the shortage of farm labour, stray domestic animals, far-flung farmland, old age, land fragmentation, landowner absence, and unfavourable crop sharing. Technical factors include lack of or damaged irrigation canals, lack of water sources, pests and diseases, poor soil, and degenerated seed. Fallowing of wetland is a grave concern as less than 8% of Bhutan's total land area is arable. (Source: Bhutan Observer, 2009).

Samdrup Jongkhar (together with Samtse, Chhukha, Dagana, Mongar and Trashiyangtse) is one of the dzonhkgags with less than 1% of rural households using power tillers and other machinery as a means of cultivation. By contrast, 98.6% of Samdrup Jongkhar rural households (compared to 89.2% nationwide) use bullocks. In Samdrup Jongkhar, only 0.9% of rural households (compared to 7.5% nationwide) use power tillers and other machinery. Only 0.2% of Samdrup Jongkhar rural households (compared to 2.3% nationwide) use both bullocks and power tillers, and 0.3% (compared to 1% nationwide) are digging manually.

Use of fertilisers and plant protection chemicals

Farmyard manure (FYM) and chemical fertilisers are the two major sources of soil nutrients for crop production. Bhutanese farmers also use certain plant protection chemicals (an industry euphemism for pesticides now adopted by governments) against pests / diseases and unwanted vegetation in order to stimulate (again in industry terminology) "optimum crop production." The distribution of chemicals for "plant protection" more than doubled between 2000 and 2007. Gasa Dzongkhag has the highest (91.2%) and Zhemgang the lowest (19.7%) proportion of households applying FYM.

Unfortunately, Samdrup Jongkhar ranks among those dzongkhags with only a modest proportion of households using organic fertilisers for cultivation. Thus, in Samdrup Jongkhar in 2008, 1,235 MT of organic fertilisers were used by 34.5% of rural households, a considerably smaller proportion than the 64.2% of rural households nationwide that use organic fertilisers. The quantity used in Samdrup Jongkhar corresponds to just 1.6% of the whole quantity of organic fertilisers used in Bhutan.

This relatively low use of farmyard manure in Samdrup Jongkhar farming does not, however, translate into high chemical fertiliser usage. Thus, in 2008, 76.15 MT of chemical fertilisers were used by a total of 10.1% of Samdrup Jongkhar rural households, corresponding to 2.9% of all chemical fertiliser use in the whole country.

As for "plant protection chemicals" (i.e. pesticides), 5.6% of rural households in Samdrup Jongkhar used 6.30 MT of plant protection chemicals, amounting to 1% of usage in the

whole country. (Source: RNR census 2009). By chemical type: 77 kg/litres of insecticide (1.99% of the total used in Bhutan) were supplied to Samdrup Jongkhar in 2008-2009; 7 kg/litres of fungicides (0.3% of the Bhutan total), 1.7 kg/litres of rodencides (3.3% of the Bhutan total), and 9 kg/litres of non-toxic plant protection (0.1% of the Bhutan total). No herbicides, acaricides, or bio-pesticides were distributed to Samdrup Jongkhar in these years. (Source: National Plant Protection Centre [NPPC], 2010).

Organic farming is the form of agriculture that relies on crop rotation, green manure, compost, biological pest control, and mechanical cultivation to maintain soil productivity and control pests, and excludes the use of synthetic fertilisers and synthetic pesticides, plant growth regulators, livestock feed additives, and genetically modified organisms. The Royal Government of Bhutan is making strong efforts to convert agriculture in the country fully to organic production.

This government commitment means replacing chemical fertilisers and "plant protection" by organic methods. The problems associated with inorganic fertilisers are well documented. For example, many inorganic fertilisers do not replace trace mineral elements in the soil. Studies have linked this depletion with a marked fall (up to 75%) in the quantities of such minerals present in fruit and vegetables. The production of chemical fertilisers also consumes high levels of energy and fossil fuels and is seen as ecologically unsustainable for a wide range of reasons. For example, chemical fertilisers are a major source of water pollution. Pesticides may also have serious health impacts on human organs and generally cannot be removed by washing or boiling produce.

Conversely, the large benefits of organic fertiliser use have also been demonstrated. Their use has been shown to improve the biodiversity and long-term productivity of the soil, to increase the abundance of soil organisms by providing organic matter and micronutrients that help plants absorb nutrients, and to drastically reduce the need for external inputs of pesticides, and therefore energy.

Organic agriculture also supports Bhutan's GNH philosophy by protecting ecological bio-diversity, cultural traditions, and the health and welfare of the country's people. As stated by the Honourable Prime Minister of Bhutan, Jigmi Y. Thinley, on 11th March, 2011:

> Going organic is truly a GNH path forward ¾ strengthening all four pillars of GNH. Going organic will enrich and keep our soils healthy and fertile in perpetuity rather than degrading and depleting them through use of synthetic chemicals. Going organic will protect our precious ground water and surface water from pollution and fertilizer run-off. It will protect our biodiversity and save our birds and animals from the deadly effects of chemical pollution.
>
> Going organic will create new economic opportunities for farmers and rural communities both by adding value to what they produce and by reducing the costs of farming, since they'll no longer have to pay for expensive imported pesticides,

fertilizers and other chemicals. The Indian demand for organic products is growing so fast that the market will never be satiated.

Going organic will empower farmers by reducing their dependence on foreign farm inputs, chemicals, and imported patented seeds, and by creating local seed sovereignty, and increasing reliance on local wisdom, traditional farming methods, and freely available local materials like manure, biomass, and leaf compost that fertilize and enrich the soil. I don't see us just growing more organic food but developing our own organic fertilizers and pest control agents using natural materials based in the rich medicinal flora for which Bhutan is renowned.

And maybe most importantly, going organic will strengthen our culture and rural communities. By creating good economic opportunities for our educated youth in rural areas, we can begin to stem the massive rural-urban migration that has created such serious demographic, economic, and social stresses. That in turn will keep our rural communities, with their networks of social supports, vibrant extended families, and mutual dependence, strong and vital.

Going organic is living GNH. Going organic is not only fulfilling an explicit promise this government made in 2008 and affirmed again in my State of the Nation address. It is also key to putting GNH fully into practice and action in this country.

Prior to this government's commitment to go organic, the use of pesticides nearly doubled from 16,475 kg/litres in 2005 to 31,707 kg/litres in 2008. (Source: NSB 2009). Experts note that it is dubious if the proper doses and spray schedules are followed by farmers using these chemicals.

Agriculturists say that "like weeds that take over the crops in a farm, so have pesticides and fertilisers taken over traditional farming methods to control pests and improve soil fertility". Thus, it seems that since farmers adopted synthetic fertilisers and pesticides in Bhutan in the 1960s, traditional farming practices have been slowly abandoned.

For example, some farmers today are no longer aware of any traditional practices to control pests. For this reason, Navdanya farmer trainers in early 2012 carefully studied manuals of Bhutan's flora and herbs to identify local biological pest control agents, and current Samdrup Jongkhar Initiative farmer trainings conducted by Navdanya are presently re-introducing this knowledge. Few farmers, however, are still practicing traditional methods, such as crop rotation, burning dried leaves on beds ready for sowing, use of manure or green biomass on the fields for a week to rot, fumigation by ash, etc. These practices too are being re-introduced in the SJI farmer trainings.

Cultural practices are also vanishing. Astrologers are no longer consulted before sowing of seeds as was once customary. On the other hand, when yields are affected by poor weather or other conditions, farmers blame it on not following the customs. Some say that "a return to the old ways may be the path to the future".

It is widely accepted that major efforts in education and information sharing will be required if Bhutan is to become 100% organic. Aiming to strengthen and spread organic farming and to enhance farmers' income via organic agricultural development, the National Organic Program (NOP) conducted a week-long training on organic farming in April 2011, and has now included the Samdrup Jongkhar Initiative in its three-year plan. The College of Natural Science in Lobesa will soon offer education on organic farming as well. Dr. Vandana Shiva is already greatly contributing to organic farming training in Samdrup Jongkhar by despatching her top farmer trainers and soil scientist from her own organic training farm in Dehradun (see http://www.navdanya.org).

Fortunately, the transition to organic in Samdrup Jongkhar will be aided by the reality that "the old ways" are still not too far distant from present realities and current memory. Indeed, some remote parts of Samdrup Jongkhar are already 'organic by tradition', simply because chemicals have not yet penetrated those regions. In these areas particularly, but also more widely in the dzongkhag, SJI farmer trainings since December 2010 have found that the direct transition to the best organic farming methods is quite a natural process.

Navdanya's farmer trainers have generally needed only to advise on very manageable adjustments that farmers are more than willing to make □ for example improving composting methods and storage, ensuring that different kinds of compost are spread at exactly the right times and in the right manner to ensure optimum results, improving biological pest control methods, saving and storing seeds effectively, and more. Recently, Rinchen Dorji, a retired agriculturist, and C. V. Biswas, a retired potato expert, set up an organic farm in Toktokha (Punakha) where various vegetables are grown. With this initiative, the promoter (Karma Group of Companies) is hoping to show people that if they are willing to work hard using the best methods, they can have a good life as educated farmers. This will hopefully motivate farmers to stay in rural areas instead of moving to urban ones. However, this kind of farm is also geared to entrepreneurs since they require a large investment to follow the Toktokha model. However, the model is potentially very applicable to a cooperative of farmers pooling their resources.

One major challenge for Bhutanese farmers in going organic is the present lack of a robust and viable market for organic produce, since most Bhutanese are still not aware of the value of organic products and are not ready to pay more for them. Therefore present potential markets are hotels in Bhutan that can market their organic offerings as a draw for tourists, as well as export markets in India and beyond.

Another problem the Toktokha farm has encountered is in finding manure. Initially, it had to be collected from distant places, which was not sustainable. One lesson learned, therefore, is that cattle must be part of a viable organic system, not only to obtain natural fertiliser but also to make organic pesticides from by-products like cow urine. It is expected that the Toktokha farm will take five to six more years to be fully sustainable and viably established. The National Organic Program (NOP) is confident that the farm

can become one of the model organic farms run by private entrepreneurs. (Source: *Bhutan Observer*).

Issues in RNR

Important challenges affecting farming activities in Samdrup Jongkhar are: insects/diseases, insufficient irrigation, unproductive land, crops lost to wildlife, drought, excessive rain, hail storms, landslides/erosion, wildlife depredation on livestock, livestock diseases, livestock feed shortages, land shortage, and limited market access.

Please see the main Samdrup Jongkhar Profile report for statistical data from 2008 on the percentage of households reporting they are affected by various challenges encountered in farming activities, (source: RNR census 2009). Some of these data are also provided in the following section.

Ranking those results, the challenges affecting the largest number of households are limited access to markets and crops destroyed by wildlife activity. Insects and diseases are also of great significance as well as irrigation problems and land shortages. In terms of magnitude of difficulty, the farmers ranked their most important constraints as crops lost to wildlife, insufficient irrigation, and land shortages. Details are in the main Samdrup Jongkhar Profile report.

On the positive side, the 10th Five-Year Plan also set major targets for the agriculture sector, including actions designed to overcome these and other challenges. The Plan linked targets for the RNR sector to the four pillars of GNH. Some of these targets and opportunities are described in the following sections. (Source: 10th FYP).

Irrigation

According to one source, there are presently 2,669 km of functional irrigation channels in Bhutan. (Source: Dzongkhags and Departments, April 2010). However, other statistics released in June 2010 report that there are 1,307 irrigation schemes in the country with a total length of 3,292 km. (Source: Dzongkhag Agriculture Sector, June 2010).

Only 17% (156,358 ha) of the country's arable land is covered by irrigation facilities. The rest, 76% (119,535 ha), depends on rain. Most of the country's irrigation developments until today have been confined to paddy, which contributes to 39.3% of cereal production in Bhutan. Irrigation can help double or triple the crop production.

With accelerated decentralization, however, the priority given to irrigation in the country's agriculture policy has decreased, as other sectors like farm roads have been given more importance. However, irrigation is increasingly important in the face of major dangers posed by climate change. Indeed, remarkable and disturbing changes in rainfall patterns and intensity have been already observed, and some farmers have not been able to plant their crops on time.

Under the 10th FYP, 101 km of new irrigation channels and renovation of the existing ones are being undertaken. These actions are projected to increase wetlands under dry season irrigation from 40% to 70% (source: *Bhutan Today* and 10th FYP).

In 2008, 30.6% of the households in the whole country reported being affected by insufficient irrigation. After crops damaged by wildlife, lack of irrigation was reported in 2008 as the second most important farming constraint. In Samdrup Jongkhar, 16.9% of rural households reported being affected by insufficient irrigation. Lack of irrigation also accounts for the 7% of the lands left fallow in the dzongkhag.

New irrigation construction in Samdrup Jongkhar in 2007 increased the total kilometres of irrigation channels from 25.9 km to 32.9 km (source: NSB 2009). But newer statistics (June 2010) report that there are now a total of 41 irrigation channels in Samdrup Jongkhar with a total length of 100.5 km (3% of the total current length of irrigation channels nationwide). However, these statistics do not provide information on the functionality of the channels (source: Dzongkhag Agriculture Sector, June 2010). Other sources (see below) report 50% non-functionality.

A recent (March 2010) study by the United Nations Food and Agriculture Organization (FAO), titled "Southern Zone Irrigation Development Reconnaissance Mission Report" contains important new agricultural data on Samdrup Jongkhar, Sarpang, and Samtse Dzongkhags, and it identifies potential opportunities for the region. These three dzongkhags, which together comprise about 15% of Bhutan's total land area, together have 40% of Bhutan's potential area for rice cultivation, and more extended flat lands suitable for medium to large scale irrigation than any other region of the country.

However, the report estimates that more than 50% of these potentially cultivable areas are not presently under cultivation, while the rest is generally cultivated for a single rain fed crop during the monsoon season. With assured irrigation, the FAO report notes that these three Southern Zone dzongkhags could produce two crops of paddy per year rather than just one.

The FAO further reports that even those few areas that already have assured irrigation are not currently being double cropped. Of the 41 irrigation channels in Samdrup Jongkhar with available data, half were reported to be non-functional. As well, many Southern Zone farmers reported inefficient irrigation techniques, and the FAO recommended improvements in the design of field geometry that could improve the distribution and uniformity of irrigation.

This irrigation issue is particularly important for Samdrup Jongkhar agriculture and for improvement of living standards in the region both because of the low present productivity of the dzongkhag's paddies, and because the difference in yields between irrigated and non-irrigated crops is enormous. Under fully irrigated conditions, the FAO report estimates the highest potential yields at 18,000 kg/acre, while present yields from rain-fed production were only around 350 kg/acre.

The adoption of System of Rice Intensification (SRI) practices which require 25-50% less water would also be of great benefit (see further for more information on SRI).

Crops

Cereals

When looking at total cereals production, 9,466 mT (amounting to 6.6% of the total amount grown nationwide) was produced in Samdrup Jongkhar in 2009. The most commonly grown crop in Samdrup Jongkhar is maize. Maize production, however, seems to be irregular. The highest production level in the last 10 years was in 2005 with 17,045 mT grown (21.3% of the total grown in all Bhutan). In 2009, the latest year for which statistics were available at the time of writing, maize production was only 4,345 mT (7.11% of the total produced in Bhutan) □ amounting to only 25% of the amount produced in 2005 both in total quantity and in percentage terms in relation to the country as a whole. The reasons for this dramatic decline require further investigation.

After maize, rice paddy is the next most common crop grown in the Dzongkhag with 4,430 mT (6.7% of the amount grown nationwide) produced in 2009.

Millet is another commonly grown crop in Samdrup Jongkhar. Its reported production has also been highly irregular over the years. In 2006, a total of 1,380 mT (15.5% of the total grown in Bhutan) was produced. But in 2009, the amount produced was only 135 mT (3.2% of the millet grown in Bhutan) □ amounting to less than 10% of the amount grown in 2006, and a drop of 80% in comparative terms relative to millet production in the rest of the country. Again, further investigation is required to understand the causes for this enormous decline in both absolute and relative terms.

Buckwheat is another very important crop in Samdrup Jongkhar: 437 mT were produced in 2009, accounting for 11.2% of the whole country's buckwheat production. Samdrup Jongkhar is the second largest producer of buckwheat of the country. It should be noted that buckwheat is in increasingly high demand in Europe where it is valued for its health effects, and is a potentially lucrative crop for Samdrup Jongkhar.

Although a total of 818 mT of oilseeds were produced in 2006 (9.5% of the total produced in Bhutan), production in the year 2009 was only 151 mT (6.5% of the total produced in the whole country) □ a drop of more than 80% since 2006.

Soya bean production in 2009 accounted for 7.3% of the national production with 40 mT grown in Samdrup Jongkhar. Mustard crops are also found in Samdrup Jongkhar. In 2009, 111 mT were produced (5.7% of the total grown in Bhutan).

Wheat production has also seen a huge decline in Samdrup Jongkhar: Although 637 mT (7% of the nationwide production) were produced in 2006, only 27 mT (0.6% of the amount grown in all of Bhutan) were produced in 2009. This is an enormous decline of 96% in absolute terms and 91% in relative terms as a proportion of the total grown in Bhutan. Again, investigation into these major production declines between 2005-6 and 2009 is required.

Samdrup Jongkhar produced 89 mT of barley in 2009 (3.7% of barley production in the country as a whole).

(Source for all the above production statistics: RNR census 2009).

Rice

Rice production plays an important role in food supply in the country and is cultivated largely for domestic consumption. In 2001, it was reported that as little as 1% of the rice grown in Bhutan is being marketed, but a farmers' survey indicated that around 15% is indeed marketed.

In a country where more than two-thirds of the population is engaged in agriculture, the production of rice in Bhutan was 74,720 mT in 2006, with some 67,568 acres (273.4 km^2) under cultivation for rice. This quantity increased dramatically from 44,000 mT in 2000 □ an increase of 70% in just six years. Rice production in Bhutan had also previously increased by 58% between 1989 and 1997, according to an assessment of the rice research programme in Bhutan.

The most important rice growing areas in the country are Samtse, which has the highest rice growing area in Bhutan with 2,889 hectares, followed by Sarpang with 2,839 hectares and Punakha with 1,971 hectares. Production, however, is highest in Punakha with 6,274 mT grown a year. Other key rice-growing areas include Paro and Wangduephodrang, which has one of the most important rice institutes in the country at Bajo.

According to Ganesh B. Chettri, the Joint Director of the Department of Agriculture, a significant percentage of agricultural land has been destroyed to make way for development infrastructure in the country, especially in Thimphu. However, he believes that the rice produced in Bhutan is sufficient for 50% of the population. Also, while the country is a notable grower of rice, Bhutan still has to import 6,000 to 7,000 mT of rice every year, according to Singay Dukpa, the Deputy Managing Director of the Food Grain Division of the Food Corporation of Bhutan.

Rice Productivity

Throughout Bhutan, several different varieties of rice are grown in a wide range of elevations from subtropical lowlands (150 m above sea level) in the south up to elevations as high as 2,600 m in the north.

Different sources provide different estimates for the amount of land under cultivation for rice. As noted above, 67,568 acres were reported as being under rice cultivation in 2006. But 2009 RNR data indicate that this may refer to total irrigated land rather than area under actual rice cultivation. Thus, the 2009 RNR Census reported that the present production of rice is actually cultivated in 46,585 acres out of 69,414 acres of irrigated land and is less than 3 ton/ha. This low level of productivity is not sufficient to ensure food self-sufficiency in rice production for the country (source: RNR census 2009).

Samdrup Jongkhar produced 4,430 mT of rice (6.7% of Bhutan's total rice production) in 2009. (Source: RNR census 2009).

Agricultural scientists estimate that the productivity of the current system could be greatly improved by use of shorter season varieties, crop rotation, and managing the crop

for early planting and harvesting.

SRI
To enhance rice productivity in ecologically friendly ways, the System Rice Intensification (SRI) method has been largely investigated under the auspices of the Ministry of Agriculture's National Organic Program (NOP), so far with successful results. This method is known to have advantages for small and marginal farmers in both economic and environmental benefits, when compared to conventional rice growing methods.

System Rice Intensification is a fully organic natural practice involving no chemicals, which significantly increases rice yield, reduces grain maturity time, and enables farmers to save seeds (80-90% more than in conventional systems) and water (25-50% less usage than conventional systems). At the same time, it gives a better grain quality, greater pest and disease resistance, and more tolerance for lodging and drought. Research has shown positive results in the application of the method to other crops as well. (Source: Lhendup, Karma, 2008). It is likely that SRI could very greatly enhance productivity in Samdrup Jongkhar as well. More information on SRI can be found at: http://ciifad.cornell.edu/sri/countries/bhutan/index.html.

Horticulture
In 2009, the largest vegetable production in Samdrup Jongkhar was cucumbers (237 mT, amounting to 8.1% of Bhutan's total cucumber production). The second was onions (28 mT, or 7.4% of Bhutan's onion production), followed by green leafed vegetables (163 mT, 7.2% of Bhutan's production), pulses (237 mT, 6.7% of Bhutan's production), pumpkins (355 mT, 6.7% of Bhutan's production), radishes (265 mT, 4.8% of Bhutan's production), egg plant (32 mT, 4.3 % of Bhutan's production), and chilis (175 mT, 4.1% of Bhutan's production).

Potato production is not common in Samdrup Jongkhar and has been irregular through the years: Thus, 827 mT (1.6% of total potato production in Bhutan) were produced in 2007, but there are no data available after 2007. Other vegetables grown in the dzongkhag are tomato, cabbage, broccoli, squash, carrot, cauliflower, turnip, and asparagus. However, their production is very minimal. (Source: RNR census 2009).

In the area of spices, Samdrup Jongkhar produces 15% of the ginger grown in Bhutan (563 mT), 5.2% of the garlic (32 mT), and 2% of the cardamom (21 mT). (Source: RNR census 2009).

Fruits
In the area of fruit production, in 2009, Samdrup Jongkhar produced 17.2% of the arecanut (bettlenut) produced in the whole country (1,097 MT), 12.8% of the peaches (156 MT), 10% of the walnuts (24 MT), 8% of the guavas (77 mT), 7.6% of the mandarins (3,372 MT), 7.4% of the bananas (162 mT), 4.5% of the pears (49 MT), 4.3% of the mangos (13 MT), and 3.7% of the plums (20 MT). (Source: RNR census 2009). Other fruits present in the region are passion fruit and persimmon. However, their

production level is very low.

It is a long-term intention of the Samdrup Jongkhar Initiative to exploring the marketing of fruits (and vegetables) through production of value-added products likeorganic jams, juices, pickles, and dried fruits, which can be especially effective when storage is a problem.

Two of the major citrus production areas in Eastern Bhutan are Gomdar and Wangphu Gewogs in Samdrup Jongkhar. The citrus harvesting period in those regions is December-February, and there is generally high market demand for these citrus products. A potential advantage for the region is that nearly all citrus produced in Eastern Bhutan and bound for export markets passes through the Samdrup Jongkhar auction yard. An export office was opened in Samdrup Jongkhar in 2009 to facilitate sending oranges from Eastern Bhutan to Bangladesh using the Tamabil transit point.

At the time of writing, the auction price of oranges in Samdrup Jongkhar ranged from Nu. 35/pon to Nu. 192/pon. (One pon is equivalent to 80 oranges, and is the official unit at the auction yard). However, since most farmers sell their trees to contractors and fruits are generally harvested, packed, and transported by these contractors, it is nearly impossible to estimate the farm-gate price of oranges on a per-kilogram basis.

However, according to farmers, production in general is falling every year. Many citrus trees in the region are dying, and farmers are facing huge loss of fruits due to citrus greening disease, phytophthora rot, citrus fruit fly, and powdery mildew infestations. Other reported limitations to effective citrus production and marketing in the region are poor input supply (seedlings, fertiliser, irrigation, agricultural chemicals), inadequate knowledge and skills that result in poor management of orchards, untimely harvesting of the fruits, poor handling and inappropriate packing, poor infrastructure (road networks, collection centres/packinghouses/grading facilities), limited access to credit facilities, and high losses during post-harvest handling due in large part to storage shortages.

Many farmers expressed to SJI researchers that they suspect that the buyers of oranges have formed some sort of syndicate leading to very low prices, and the farmers/ contractors therefore have no choice but to sell the product at whatever price is offered. To strengthen their own hand in such negotiations, it is likely that Samdrup Jongkhar and other eastern Bhutan citrus farmers would benefit greatly from the creation of cooperatives.

Another constraint in marketing citrus for export is the frequent strike activity in the neighbouring states of India (mainly in Assam and West Bengal) frequently forcing the farmers to transport their produce via the lateral highways (to Phuentsholing), which proves to be much slower, more time-consuming, and hence more expensive.

A ‘Value Chain Promotion Strategy” for the orange subsector of Bhutan has been developed. The Strategy’s major goal is to increase production volume and yield and to maintain the position of the orange subsector at the top of Bhutanese export commodities

by reducing the cost of production and improving marketing. (Source: Citrus in Bhutan: Value Chain Analysis, Department of Agricultural Marketing and Cooperatives,).

Livestock

Livestock production is another important source of income for many Samdrup Jongkhar farmers. 8,764 acres in the dzongkhag are under tsamdro (grazing land). In 2008, there were 17,123 cattle in Samdrup Jongkhar (5.5% of all cattle in Bhutan), 1,268 horses (5.7% of the nationwide total), 565 pigs (3% of all those in Bhutan), 9,849 poultry (5% of the Bhutan total). (Source: RNR census 2009). In 2005 (no data available after 2005), there were also 120 sheep and 179 goats in the district. (Source: NSB 2007).

The 2007 Bhutan Living Standards Survey (BLSS) reports that in rural areas nationwide, one in five households owns pigs. But in Samdrup Jongkhar, 90.8% of the households do not own any pigs, while 8.6% have one or two pigs and 0.6% of households own more than two pigs. About one in five rural households in Samdrup Jongkhar have horses □ the same percentage as nationwide.

The national data show that two in five rural households own one to five cattle and about a third of households own more than five. In Samdrup Jongkhar, however, nearly half of rural households (45.9%) do not own any cattle, while a little more than one third (34.1%) own up to five cattle and one in five own more than five. Navdanya farmer trainers have advised, and the experience of the Toktokha farm described above confirms, that presence of cattle is essential for provision of the farmyard manure required for organic farming.

Gomdar, Martshala, and Phuntshothang are the gewogs with the highest concentration of livestock in Samdrup Jongkhar. Goats are not too common in Samdrup Jongkhar, present only in 4.5% of the dzongkhag's rural households. Poultry is owned by half of rural households nationwide and by 37.4% of the households in Samdrup Jongkhar. Two thirds of the dzongkhag's poultry are in Gomdar, Langchenphu, Martshala, and Phuntshothang. (Source: BLSS 2007). There are seven livestock extension centres, one livestock farm, and one satellite veterinary laboratory located in Samdrup Jongkhar (source: 9th FYP).

The 10th FYP intends to establish a fish seed production centre in Sonamthang to cater to increased meat demand in Samdrup Jongkhar Dzongkhag and the other five eastern dzongkhags. The Samthang Fishery community in Wangdue Dzongkhag will be taken as a model. This initiative is intended to target and benefit communities in remote areas. However, it must be noted that past efforts to promote fishery, poultry, and piggery farms for meat production in Bhutan have not been successful due to religious beliefs that prohibit the killing of any sentient being.

Imported food

According to a study conducted by the agriculture research centre in Wengkhar in Mongar Dzongkhag in 2009, 51% of the total rice consumption in 50 of the 69 gewogs in the six eastern dzongkhags is imported.

The amount of food imported to Bhutan remained more or less stable between 2002 and 2007. In 2007, 7,410 mT of rice (worth 88 million Nu.), 810 mT (5 million Nu.) of wheat products, 1,230 mT (18 million Nu.) of sugar, 1,000 mT (47 million Nu.) of oil, 310 mT (9 million Nu.) of dal, and 200 mT (0.7 million Nu.) of iodized salt were imported.

Obstacles and opportunities

Initial research indicates that some of the main obstacles to increased productivity, viability, and prosperity in agriculture in Samdrup Jongkhar are infertile soils, wildlife predation (especially from wild boar, monkeys, and elephants), pests and disease, use of inappropriate plant varieties, shortages of farm labour, lack of institutional support and information for farmers, and limited access to markets (source: FAO).

To some extent, therefore, the effective handling of these challenges also constitutes a significant strategy to improve economic opportunities in Samdrup Jongkhar agriculture. As well, there are clearly other opportunities for improving Samdrup Jongkhar agricultural productivity in sustainable ways, such as shifting to high value organic products. The Samdrup Jongkhar Initiative is collaborating both with the National Organic Program (NOP) and Navdanya to make organic farming viable and lucrative in Samdrup Jongkhar.

One future challenge in the conversion to organic farming is affordable institutionalized certification that will allow export of Samdrup Jongkhar value-added organic products to western countries. For organic export, products must fulfill the criteria of the country of destination. Organic certification up to now by agencies like Bio Bhutan is being done through India at a high price. The National Organic Program (NOP), however, is working on creating a Bhutanese certification, modelled on the highly successful Participatory Guarantee System (PGS) in India, which is much less expensive for producers. This is also the system under exploration by the SJI.

The FAO irrigation report referenced above notes that much of the topsoil in the three Southern Zone dzongkhags it investigated (Samdrup Jongkhar, Sarpang, and Samtse) varies from light clays to sands. Soil in the region is generally not very deep and often overlays gravel. The most common present method for increasing soil fertility is having cattle in the fields and incorporating this cattle manure into the soil. In what certainly constitutes a major advantage from a sustainability perspective, it is noteworthy that use of chemical fertilisers remains minimal in Samdrup Jongkhar, with only 10% of farmers reporting such usage. In SJI-sponsored trainings, Navdanya farmer trainers have been showing Samdrup Jongkhar farmers how to improve and refine their manure-based composting methods to improve productivity.

As noted above, crop damage from elephants and monkeys is a major concern in the region. Weeds and crop diseases are also fairly common, but farmers presently dedicate few resources to their prevention. Thus, investigating organic and biological controls for weeds, pests, and crop diseases can constitute an important path to improved agricultural productivity in Samdrup Jongkhar. Again, Navdanya soil scientists and farmer trainers are assisting Samdrup Jongkhar farmers in identifying such locally-based biological

controls.

Procuring new seeds for all crops, and particularly for new rice varieties, has in the past been extremely difficult for farmers in Samdrup Jongkhar. The research station and neighbouring seeds corporation in Bhur have been overstretched and underutilized in attracting rice and wetland farmers in Southern Bhutan. The recent establishment of two new local seed banks in Samdrup Jongkhar should help improve this situation. Based on Navdanya's extensive work in promoting seed sovereignty in India, Navdanya farmer trainers have also begun to train Samdrup Jongkhar farmers in seed saving and storage..

As indicated in the section on irrigation above, water management has been a primary inhibitor of agricultural development in Samdrup Jongkhar, particularly in rice cultivation. Obstacles to improving irrigation systems in the dzongkhag include limited availability, non-functionality of a significant proportion of existing systems, and lack of knowledge about irrigation on the part of farmers. Restoration of non-functional systems and improved training in this area, including maintenance and repair of systems, is likely to yield substantial short-term gains in productivity at modest cost.

As well, there is an abundance of undulating areas in Samdrup Jongkhar, where water could potentially be collected during the monsoon season for later small-scale use for cash crops and vegetable production. However, soils on which the water collection structures would be located will need to be assessed for their ability to hold water. The Samdrup Jongkhar Initiative is presently collaborating closely with the Jigme Namgyel Polytechnic's new Centre for Appropriate Technology to explore pilot development and testing of rainwater harvesting systems suitable for the dzongkhag's conditions.

The adoption of the System of Rice Intensification (SRI) referenced above also holds great potential for improving productivity and ecological sustainability in rice-growing regions of Samdrup Jongkhar. The potential applicability of SRI to other crops is also encouraging.

Rural to urban migration, particularly of educated young people, presents an immense challenge to farmers and agricultural development in Samdrup Jongkhar. The shortage of farm labour is one of the main reasons for leaving fields fallow. Indeed, one of the key objectives of the Samdrup Jongkhar Initiative is to stem the rural-urban tide by creating improved economic opportunities for youth in the region.

Difficulties in accessing markets, due to poor infrastructure such as roads and storage facilities, high transport and other costs, and lack of adequate and reliable supply, constitutes a major obstacle to improving the economic viability of agriculture in Samdrup Jongkhar. The dzongkhag is relatively isolated from major domestic markets in Thimphu, Paro, and elsewhere, but it does have the advantage of bordering India. (Source: FAO and SJ 10th FYP).

In this regard, Samdrup Jongkhar may potentially benefit from recent initiatives to

improve market access. In 2006, for example, the International Fund for Agricultural Development (IFAD) initiated the Agricultural Marketing and Enterprise Promotion Programme (AMEPP) in partnership with the Kingdom of Bhutan. AMEPP has a total budget of $US19.6 million and its development work was completed in June 2011.

In January, 2009, IFAD identified a new project, the Market Access and Growth Intensification Project (MAGIP) that is comprised of four components: Market Access Development; Pro-Poor Support; Growth Intensification; and Management. This project has recently incorporated an irrigation component focused on two gewogs in the Bhangtar region of Samdrup Jongkhar that are assessed to have some of the greatest potential for irrigation development in Bhutan.

Market opportunities that could potentially improve agricultural viability in Samdrup Jongkhar are also seen in possible processing of a range of farm products, particularly rice, citrus, and spices, and possible production of organic jams, pickles and other value-added products. This is also a key area for future investigation in the Samdrup Jongkhar Initiative, and could yield important pilot projects that will require monitoring for success.

Production of organic tea is another possible option for regions of Samdrup Jongkhar, especially in light of the high quality and renown of tea in neighbouring Assam (http://news.bbc.co.uk/2/hi/south_asia/8640016.stm). However, one study found that "growing organic tea in northeast India is a difficult task," (http://www.indiaenvironmentportal.org.in/node/25499), so any such development in Samdrup Jongkhar will need to be carefully investigated and planned.

Nevertheless, there is considerable evidence that organic tea production reduces input costs and improves the quality of green leaf, making it more acceptable in foreign markets. Production of organic tea is also rising worldwide in response to growing demand. The majority of Assamese tea (about 75%) is presently sold in France, Germany, Japan, the United Kingdom, and the United States, indicating that there is potentially a lucrative niche export market for organic Samdrup Jongkhar tea.

Cooperatives

Group formation and working together for the collective good have always been key ingredients in promoting solidarity in traditional Bhutanese society (e.g. household labour sharing, communal management of grazing land, protection and sharing of water sources and irrigation, etc.). Farmers' groups associations are also very much in line with the policy of decentralization and are an effective way to enhance rural development. Further farmer cooperative development in Samdrup Jongkhar has the potential not only to enhance agricultural productivity, efficiency, and marketing capacity, but also to strengthen community bonds in the dzongkhag.

Demonstrated social benefits of working in cooperatives include:

- Empowerment of the members through ownership of the enterprise.
- Increased participation of community members for development and management

- Increased cohesion within the community for management of common resources
- Capacity building and empowerment of members for technical and managerial skills (leadership, financial management and accounting)

Demonstrated economic benefits include:

- Enhancement of rural livelihoods through improving income
- Improved access to resources (e.g. forest resources through Community Forest (CF) management)
- Improved bargaining power for selling and buying
- Improved bulk delivery of products making it easier and cheaper to access markets
- Reduction of cost per unit of produce and thus increased income
- Improved production techniques, skills, and quality of produce
- Broadening market opportunities for value addition by processing and offering assured type and quality
- Improvement of products and services owing to improved facilities and equipment and enhanced skills among the group members
- Development of a group saving scheme as self-help measures for group development and needs

Demonstrated environmental benefits include:

- Increase in vegetation cover through CF plantation and crop production, and great collective capacity, training, and will to conserve soil, and thereby to control erosion and landslides
- Controlling the incidence of forest fire through community monitoring of forests
- Conservation and protection of watersheds
- Improvement of cattle breeds and livestock management systems with concomitant decreasing pressures on open forest grazing

One of the main identified tasks under the Accelerated Bhutan's Socio-economic Development Programme (ABSD) is to give enhanced legal status to farmers' groups and cooperatives. Bhutan's Cooperative Act was enacted in 2001 and amended in 2009, and the Department of Agricultural Marketing and Cooperatives was created under the Ministry of Agriculture to support and aid agricultural cooperative development nationwide.

In addition to the benefits listed above, being registered as a cooperative or farmers' group has several additional practical advantages, such as enhanced access to loans/credits, right to formal contracts, full legal status including right to appear in court as a legal entity, and the ability to receive grants, donations, and assistance from foreign and domestic sources (with prior approval from the Ministry of Finance).

There are presently about 400 farmers' groups in the country. Examples of such groups are Water User Associations, Community Forest Management Groups, Seed Growers Groups, Savings Groups, and Dairy and other agricultural commodities marketing groups. Support for the development of farmers' groups as a vehicle for development in rural Bhutan has been recognized as a primary objective by the Royal Government of Bhutan since the early nineties and is now being promoted rapidly in recent years through the 10th FYP. In October 2010, when the legal registration opened, 17 farmers' groups and 5 cooperatives registered. Four of them were in the RNR field and one was a group of youth involved in organic and eco-friendly promotion activities.

Among constraints facing farmers' groups, identified by the Ministry of Agriculture as the most common barriers to development and organization of farmers' groups, are:

- widespread illiteracy among farmers,
- lack of awareness about the group benefits,
- lack of cohesion among the group members,
- lack of rural manpower to participate in group activities,
- lack of resources among the group members both for basic membership fees and larger capital investment for activities like cattle purchase,
- difficulties in accessing inputs like feed, improved cattle varieties, and pullets, and
- marginal land holdings that limit the potential for intensifying cultivation and improving pasture development.
- As well, limited access to markets (inaccessibility by road) leading to high marketing costs, and lack of marketing institutions including storage facilities, have always been a challenge to the rural Bhutanese population.

Despite these major challenges, the Ministry of Agriculture notes that many farmers' groups are already generating benefits to the members, and are working effectively with transparency, cohesion, and trust of their leaders. Ministry analysts see great possibilities for further expansion of these groups. (Source: MoA, 2009).

There are a number of farmers' groups in eastern Bhutan, and an inventory of farmer's groups in Samdrup Jongkhar Dzongkhag as of December 2009 is included in the main Samdrup Jongkhar Profile report (source: MoA, 2009). Existing farmers' groups in Samdrup Jongkhar work with different agricultural products such as potatoes, oranges, vegetables, cornflakes, dairy, and a piggery. Others involve bee keeping, and Chirata management under community forests.

The oldest farmers' group in Bhutan is the Dewathang Milk Marketing Cooperative (DMMC) in Samdrup Jongkhar. It serves as a model for the entire nation. In 2009, 120 members producing about 400 litres of milk a day are benefiting from the cooperative. DMMC producers earned a total of Nu. 2,961,825 from the sale of 118,473 litres of fresh milk in 2009, 8% more than in the previous year. The cooperatives' savings also rose to Nu. 381,849. Recently, the group was further strengthened by constructing two milk collection sheds at two strategic locations, thereby reducing the need for milk producers to wait at the road side under the sun and rain to deliver their milk to the van.

A new farmers' dairy sale counter with a milk chilling device and a deep freezer to store butter and cheese was recently opened in Samdrup Jongkhar town resulting in a reliable and hygienic market outlet for the DMMC's products in the urban centre. The dairy farmers' group from Orong is selling its butter and cheese together with the DMMC milk in this booth.

In the future, the dzongkhag livestock plan includes the establishment of Milk Bars at strategic locations, so that nutritive milk is made available to school children and passersby. Having good and accessible selling points will make it easier for customers to buy the DMMC and Orong dairy group products. This will also encourage local residents to buy Bhutanese products and eventually reduce the present demand for Indian dairy products. Future plans also exist to expand into other dairy products such as ice creams and yoghurt.

Challenges currently faced by the DMMC are: increasing the unit cost of selling the milk, competition from across the border, the high cost of transportation, a mismatch between the supply of and demand for operating equipment, the need for more pasture land to expand production, and access to loans.

The cooperative not only benefits its members in very practical ways, but essentially transmits a productive, entrepreneurial, and self-reliant spirit that has the potential to help break a culture of dependence and endemic poverty that has often held back rural communities. The DMMC model is seen as having potential to strengthen communities, create opportunities, and thereby to help reduce the current rural-urban migration tide.

There is also potential for a positive impact in linking cooperatives to universities so that research can be directed towards development. Similarly, rural banking cooperatives that facilitate provision of loans to farmers, and which can promote education and innovation in rural areas, are also considered to have great potential. In sum, the added strength gained by farmers working collaboratively is seen as key to strengthening rural communities in a wide range of longer-term infrastructural and development ways beyond the shorter-term tangible benefits that cooperatives provide their members.

Industry

Samdrup Jongkhar being one of the gateways to Bhutan and commercial hub for the eastern region, it accounts for 4.6% of Bhutan's total industrial licenses. In 2009 there were 8 agro-based, 10 forest-based, 3 mineral-based, and 54 contract-based industries in the dzongkhag.

Samdrup Jongkhar Industrial Estate is one of the three actual industrial estates in the country and includes four wood-based industries covering an area of 3.2 acres. The other two industrial estates in Bhutan are Phuentsholing Industrial Estate and Njemina Industrial Estate. The 10th FYP is aiming at developing several other industrial estates in the country, one of them being Motanga Industrial Estate in Samdrup Jongkhar Dzongkhag, with the objective to promote balanced regional development and enhance growth in the rural economy. The land acquisition (152 acres) for Motanga Industrial

Estate is almost complete.

S. D. Eastern Bhutan Coal Company Ltd. in Rishore near Dewathang, the largest coal mine in Samdrup Jongkhar, was shut down in April 2009 on orders from the Anti-Corruption Commission, after an investigation determined that the company had been operating without an environmental clearance certificate since 2004. The mine re-opened in October 2009 after obtaining the certificate. About 150 Bhutanese nationals are employed with the company apart from truck drivers. The company paid Nu. 139m in taxes to the government from 2004 to 2008, in addition to its license fee. Nu 110m was the net profit for S. D. Eastern in 2008. (Source: Kuensel). A detailed description of the coal mine's operations is included in the main Samdrup Jongkhar Profile report.

A study carried out in the 1990s shows potential for oil in the Bhangtar region, since all the elements and geographical features are present, such as organic source rock, sandstone to trap the oil naturally, and cap rock on top to seal the oil. This potential has garnered interest from American businessman J. Matthew Fifield (managing director of the international Cline Group mining company) who has offered to prospect and, if viable deposits are found, to extract the oil. Fifield has also proposed that he would get a group of American investors to invest in Bhutan's mining sector "in a big way".

The Department of Geology and Mines (DGM) under the Ministry of Economic Affairs and Druk Holdings Investment (DHI) have so far expressed interest in the proposal and are in the process of studying it.. (Source: Kuensel). A discussion of the issues involved in this proposal is included in the main Samdrup Jongkhar Profile report.

Rosin and turpentine

Resins are obtained from mature chir pine (Pinus roxburghii). In Bhutan, tapping of chir pine is primarily carried out by Tashi Rosin & Turpentine, a branch of Tashi Commercial Corporation, under a 50-year lease running from 1972 to 2022.

The production only reaches about 272 tons per year, as the terrain is difficult for commercial extraction, the distribution of mature trees is widely scattered, and there is an insufficient number of labourers.

The resin from chir pine collected in central and eastern Bhutan is transported to the Rosin and Turpentine Factory in Samdrup Jongkhar for processing into rosin (78%) and turpentine oil (14%). The processing plant's production capacity is 300 tons of resin per annum. All products are sold to India, with the price for rosin ranging from Nu. 20 to 24 per kilogramme and the price for turpentine oil at Nu. 11 per litre.

Rosin is used in paper (39% of usage), paints and varnish (25%), soap (18%), and ink industries (1%). Turpentine is used in the production of camphor (85%) and paints (15%), and in the pharmaceutical industry. (Source: Manual on Resin Tapping for Chir Pine Areas Under Tapping in Bhutan).

Resin production generates gross revenues of about Nu. 4.1 million per year (272,000 kg. x 15 Nu. per kilogramme). (Source: Review on the Resin Tapping Operations in Chir Pine Forests of Bhutan, by M. R. Moktan, 1994).

Tourism industry

Before the 1970's only the royal family had the authority to issue invitations to Bhutan, and therefore almost all foreign visitors were royal guests. The first time a large number of foreign visitors entered the kingdom was for the coronation of the Fourth King in 1974. Soon after that, the first paying tourists arrived.

Tourism grew gradually, and in 1991 the industry was privatized, and numerous tourist agencies were established. Visitor numbers have continued to rise, particularly over the past few years, and tourism is now the third largest provider of foreign exchange in Bhutan. Tourism earned US$ 18.5 million in 2005, with 13,600 visitors, and $29.8 million in the 2007/08 financial year.

In 2010 Bhutan received almost 41,000 high-end tourists, of whom 28,000 were international and the remainder from neighbouring countries, mostly India. There was a 56 percent growth in tourism between 2009 and 2010 alone, and the tourism sector alone generated revenue of $US90 million in 2010.

The tourism industry is envisaged to contribute to a quarter of GDP by 2017. Promotion of community or rural based tourism, including home-stays, is considered a possible income generating opportunity during non-farming seasons for parts of eastern Bhutan, including Samdrup Jongkhar, as they gradually open to tourism that has hitherto been confined almost entirely to western and central Bhutan (ource: 10th FYP).

Presently, the vast majority of tourists visit just five of Bhutan's 20 dzongkhags □ namely Paro, Thimphu, Punakha, Wangduephodrang, and Bumthang, which account for over 77% of the total bed nights. By contrast, Samdrup Jongkhar and most other southern and eastern dzongkhags presently have little or no tourism. One past obstacle to development of a viable tourism industry in Samdrup Jongkhar and some southern dzongkhags is the past history of disturbances and security risks with the presence of militant groups. However, the area is now peaceful and therefore more amenable to exploration of tourism potential.

As well, Samdrup Jongkhar's relatively mild winter makes it a potential tourism destination during the current tourism 'off-season' from December to Februrary, when western Bhutan is very cold.

Under the 10th FYP, therefore, special support has been provided to promote tourism in eastern and southern Bhutan with Sarpang and Samdrup Jongkhar envisioned as key entry and exit points for tourists. The new Paro – Guwahati - Bangkok flight schedule introduced by DrukAir in 2011 will further open the region to tourists, since the distance between Guwahati airport and Samdrup Jongkhar can be covered in about 3 hours by car, and the Paro – Guwahati flight is only 50 minutes.

The 10th FYP promotes ecotourism in protected areas with the dual objectives of providing a sustainable income for park residents from tourism and ensuring effective biodiversity conservation. Through the South-South cooperation program, Bhutan has received valuable information on management of eco-tourism areas from Costa Rica. Eco-tourism activities are planned for implementation in the six national parks and wildlife sanctuaries. The Department of Forestry, in collaboration with the Tourism Council of Bhutan, will be responsible for the execution and coordination of these programmes.

A reconnaissance survey on probable recreational spots in the eastern part of Bhutan in order to create winter visiting venues was submitted in August 2008. One of the potential areas was located in Samdrup Jongkhar. BanglaPhu Recreational Park (4km from Samdrup Jongkhar town and 16km from Dewathang) can be considered a hotspot in terms of biodiversity. It contains a rich diversity of trees, shrubs and herbs, bamboo, cane, orchids, and bananas. Elephants, Comodo Lizards, lowland fish, and even the largest known python species (once caught swallowing an adult barking deer) are inhabitants of the park.

The park is seen as a possible destination for naturalists, tourists in winter, and Bhutanese school-children on botanical expeditions. (Source: "Reconnaissance survey on probable recreational spots in Eastern part of Bhutan mainly to create winter visiting venues", Department of Forests, Royal Botanical and Recreational Parks Division, 2009). Apart from this proposal, however, no further document has been found on this topic, and visits to the area by SJI researchers indicate that there is presently no access to or development of this area.

In the absence of conventional hotels, community-based tourism and home-stays are considered potential directions for development of a tourism industry in this region. The Nabji Trail (Zemthang) in the Jigme Singye Wangchuck National Park (JSWNP) might be used as a model for such community tourism. The project was initiated by the Department of Tourism (DoT), the Nature Conservation Division (NCD), the Association of Bhutan Tourist Operators (ABTO), and SNV, and has been in operation since 2005.

The Nabji Trail community tourism project consists in developing specific activities in each village to generate revenue for the community. The community is involved in organizing camping sites, cultural programs, and providing meal service. On a rotating basis, individuals from different villages can generate income through portering baggage from village to village, and assisting as cooks, kitchen staff, or village guides.

Other activities that generate income for local villagers from the Nabji Trail project are construction and maintenance work in the JSWNP for campsites, viewpoints, and trails, along with sales of firewood, crafts, vegetables, and other agricultural products. A percentage of these revenues is collected in a “Village Tourism Fund” aimed at generating benefits for those not directly involved in tourism activities, such as children and the elderly. Distribution of this fund will be decided upon by each village. This kind of tourism is ideal to provide income and employment during non-farming seasons.

In Samdrup Jongkhar, the Chökyi Gyatso Institute for Buddhist Studies may also attract visitors with short courses on Buddhist philosophy and instruction in meditation. If nearby or on-site accommodations could be provided, the Institute could also potentially serve as a venue for international conferences on Buddhist or GNH-related themes.

Cultural industry

Another potential strategy for vitalizing industry, community, employment generation, and income creation within a GNH context is the promotion of cultural industries in addition to cultural tourism. Cultural industries can also help to preserve the nation's diverse cultural traditions and further strengthen Bhutan's cultural identity. (Source: 10th FYP).

The proportion of Bhutanese involved professionally in cultural industries (or who have the required skills) is significant by international comparisons, and therefore provide a viable human resource base for potential creation of a strategy at the national level. Based on different surveys, the potentially viable cultural industries in Bhutan have been identified as traditional painting, traditional boot-making, sculpturing, traditional architecture, performing arts. and contemporary visual art. The movie sector is a also a significant new cultural industry. Other identified sectors include cultural and religious services, craft-based manufacturing, and media. (Source: *Bhutan Times).*

In Samdrup Jongkhar, 11.6% of the population has professional cultural skills □ somewhat less than the nationwide average of 14.4%. The proportion of the population with such skills ranges from 25.3% in Bumthang to 7.9% in Chhukha. (Source: Population and Housing Census of Bhutan [PHCB] 2005)

However knowledge and skills do not necessarily translate into actual engagement in such work. Thus, the proportion of the Samdrup Jongkhar population actually engaged in cultural occupations is only 5.4% □ one of the lowest percentages in the country. The nationwide average for cultural occupation engagement is 10.2%, ranging from 20.5% in Bumthang to 4.6% in Chhukha. (Source: PHCB 2005).

As a border region and potential gateway for tourists to eastern Bhutan, Samdrup Jongkhar is regarded as having potential for development of a viable cultural industry if appropriate infrastructure were created. Weaving is seen as having particular potential in the region.

HEALTH, HOUSING AND OTHER FACILITIES

Health

There are two hospitals in Samdrup Jongkhar Dzongkhag □ one in Samdrup Jongkhar town and one in Dewathang □ as well as seven basic health units (BHU), and 20 outreach clinics. Medical facilities across the border, particularly in Guwahati, are also easily accessible.

According to the 2007 Bhutan Living Standards Survey, the population of Samdrup Jongkhar seemed to be satisfied with existing heath facilities: Thus, 70.1% of Samdrup households ranked the health facilities as "good", 21.5% as "satisfactory," and only 0.9% ranked them as "bad". (Source: BLSS 2007).

In Samdrup Jongkhar, 19.1% of the population suffered from sickness or injury in the four weeks prior to the BLSS 2007 Survey, considerably higher than the national average of 15.7%. In fact, Samdrup Jongkhar had the fourth highest reported rate of sickness/injury in Bhutan. Tsirang had the lowest rate of illness/injury at only 7.3%; less than half the national average, while the Punakha Dzongkhag rate of 29.4% was nearly double the national average. Further analysis is required to explain these significant regional disparities and the degree to which they may be correlated with age, rural-urban migration of youth, and other socio-demographic characteristics.

Women in Samdrup Jongkhar had a sickness or injury rate 4.4 percentage points higher than men. This gender disparity is also true nationally, with females generally more likely to suffer from sickness or injury than men. Not surprisingly, persons over sixty years of age nationwide have the highest rates of illness.

In rural areas people are restricted from their normal activities by their illness/injury for longer than in urban areas. Thus, the average period of restriction due to illness or injury is ten days in rural areas and seven days in urban regions.

Nationwide, 73.9% of persons suffering from illness or injury consulted a hospital or BHU. Not surprisingly, the rate of consultation with traditional practitioners is considerably higher in rural than in urban areas. 14% of people suffering from illness or injury did not consult any type of health care practitioner, with the rate of non-consultation again higher in rural than in urban areas.

Immunization coverage in Bhutan is now 99%, and the maternal mortality rate per 1000 live births is 3.8, □ vast improvements from two decades earlier. (9th FYP).

Family Planning

The BLSS 2007 survey revealed major and even startling differences between rural and urban areas in regard to family planning. For example, teenage pregnancy is twice as common in rural areas as in urban areas. As well, 80% of urban women, but only 45% of rural women, give birth to their babies in a hospital, clinic, or maternity facility.

The survey also revealed that only 45.3% of women in Samdrup Jongkhar (compared to 72.4% nationwide) are aware of contraceptive methods, and only half of those women actually utilize contraceptives (23.3% of female respondents in Samdrup Jongkhar, compared to 35.4% nationally). On this important indicator of health and wellbeing, Samdrup Jongkhar is clearly far behind the country as a whole.

But even the national rate is far from a 'gold standard, and use of contraceptive methods is in fact quite low among women of all ages in Bhutan, but particularly among teenage girls. Only 5.6% of 15-19 year-old urban girls use contraceptives.

Although knowledge of contraceptives is considerably higher in urban (81%) than in rural (69%) regions nationwide, the national utilization rate is only slightly higher in urban (37%) than in rural (35%) areas. Dagana has the highest utilization rate (77.1%) in the country. Though Thimphu has the highest knowledge rate in the country at 88.0%, its utilization rate is only 36.5%.

Other facilities

Across the country, nine in ten persons (99.5% in urban areas and 88% in rural areas) have access to an improved water source. The lowest rate for access to improved water sources is in Gasa.

Nearly three in five households in the country have access to water through pipes in their dwellings (83% in urban areas and 46% in rural areas). The rest mostly rely on outdoor taps, and a few have access either through neighbours, or by drawing water from wells, springs, rivers, or lakes/ponds. The source of water is very well correlated to the per capita expenditure of the households: 89% of the richest households in towns have water supplied in their dwellings through pipes, while about a third of the poorest households rely on public outdoor taps. In rural areas, the proportion of rich people's houses with piped water is double the corresponding proportion of the poorest.

In Samdrup Jongkhar, 95% of people are classified as having access to an improved water source (i.e. public tap, pump, or protected well), a slightly higher percentage than the national average. About half the dwellings in Samdrup Jongkhar rely on public outdoor taps (49.0%). However, in the towns, water is commonly supplied through pipes in dwellings (Dewathang town 52.2%, Jomotsangkha 70.0%, and Samdrup Jongkhar town 77.8%). 76.7% of Samdrup Jongkhar households need between one and ten minutes to reach an improved water source, and only 1.3% need more than 30 minutes.
More than nine in ten Bhutanese (99% in urban areas and 95% in rural areas) have access to improved sanitation facilities. 97.1% of people in Samdrup Jongkhar are classified as having access to improved sanitation facilities (sewers, improved latrines etc.). This is slightly higher than the national average of 96.4%. 71.3% of the people reported having good toilet facilities. The highest rates of access to improved sanitation in the country are in Wangdue and Bumthang (99.6% and 99.4% respectively).

Nationwide, two-thirds of Bhutanese households (66%) use solid fuels such as biomass (wood, charcoal, crop residues, and dung) and coal for cooking and heating. The proportion of the rural population that uses solid fuels (80%) is nearly three times higher than in urban areas (28%). This is very likely due to the fact that 99% of urban households have access to electricity, compared to only 60% in rural areas.

The main source of lighting throughout the country is electricity (68.5% of households), while one in four households use kerosene or gas lamps. Although nearly all (97.4%) urban households draw their lighting from electricity, only 56.1% of rural households have electric lighting.

In Samdrup Jongkhar, half of the households (50.6%) have electricity as their source of

lighting. Kerosene or gas lamps are the lighting source for 42.5% of Samdrup Jongkhar households in the dzongkhag □ nearly all of them in rural areas. Just as nationwide, nearly all urban households in Samdrup Jongkhar have electric lighting.

For cooking, 40.7% of households in Bhutan use wood, 34.2% use electricity (34.2%), and 22.6% use gas. In urban areas electricity (50.1%) and gas (44.8%) are most widely used for cooking. But 57.2% of rural households in Bhutan use wood for cooking while 27.4% use electricity, and 14% use gas or other sources.

In Samdrup Jongkhar Dzongkhag, most households use wood to cook their meals (55.7%). In heavily forested gewogs like Serthi, Lauri, Gomdar, and Pemathang, wood is used by more than 95% of all households. The second main source for cooking in Samdrup Jongkhar is electricity (31.9% of all households) followed by gas (10.6%).

44% of households in the country do not have heating sources. For those that do have heating sources, the most common source in rural areasa is the bukhari (wood/coal stove), while in urban areas, electricity is generally used. (Source: BLSS 2007).

Types of dwellings

About two thirds of households in Bhutan own their dwellings. In the urban areas, however, only one out of five households owns their living space. In Samdrup Jongkhar Dzongkhag, 71.4% of all households own their dwellings. But the vast majority of urban dwellers (93.3% in Samdrup Jongkhar town and 91.3% in Dewathang town) do not own their dwellings.

In Bhutan as a whole, households typical dwell in a house (69%), an apartment (22%), or part of a house (8%). Living in houses is more common in rural areas (86%) than in urban (36%). Three quarters of the residents of Samdrup Jongkhar Dzongkhag dwell in houses (74.6%). But 67.8% of households in Samdup Jongkhar town and 34.8% in Dewathang town live in separate apartments.Rent is normally paid in cash (61.7%), but more than a third of those urban non-owning households (35.1%) do not pay any rent.

71.6% of the dwellings in the dzongkhag have one or 2 rooms, while 28.4% have 3 or more rooms. Surprisingly, household size does not seem to correlate with the number of rooms.

Across the country, about two in five households live in dwellings made out of mud-bonded bricks or stones, and a quarter live in dwellings made of cement-bonded bricks or stone. In urban areas about three out of four dwellings have cement-bonded brick or stone walls, while in rural areas the proportion is about one in ten. Richer households tend to have external walls made of cement-bonded bricks or stone, while 36% of poorer households have wood, branch, or other types of walls.

The most common materials used to construct the external walls of dwellings in Samdrup Jongkhar Dzongkhag are mud-bonded bricks or stones (33.8%) and cement-bonded bricks or stone (20.2%). However these proportions vary widely in different parts of the

dzongkhag. In Pemathang, for example, 52.2% of dwellings are made of mud, while wood and branches are the materials for 14.1% of dwellings.

Throughout the country, metal sheets are the most common material used for roofs (89.5% in urban areas and 67.3% in rural areas). Plank/shingle roofs account for 14.0% of roofs in rural dwellings against only 2.1% in urban areas. One in five rural roofs is made of thatch while only the poorest households in urban areas use thatch for roofing.

Metal sheets are also the main material for roofs in Samdrup Jongkhar Dzongkhag (62.7% of dwellings). Statistical sources classify the second most preferred material as "other" (18.7%). Roofs in one out of ten Samdrup Jongkhar dwellings are made out of thatch, and plank/shingle roofs are used in 4.3% of dwellings in the dzongkhag. Concrete roofs are mainly to be found in the towns, and account for 15.6% of the roofs of dwellings in Samdrup Jongkhar town.

Temples

Most of the larger villages have a temple, and there are smaller shrines both inside and outside inhabited areas. Samdrup Jongkhar has various sacred places and elements of great significance to local communities, such as particular trees, rivers, and other locations that have spiritual significance. There are two famous monasteries, Chho and Phatu, and 82 religious structures (Lhakhangs or Goenpas) in the dzongkhag.

Asset ownership

The most widely owned assets in both urban and rural areas of Bhutan are wrist watches, radios, rice cookers, and choeshams (Buddhist altars). More than half of the whole population of Bhutan owns such assets. One in twenty households owns motorbikes/scooters, bicycles, computers, or washing machines. Such assets are typically more abundant in urban areas than in rural ones, with the exception of radios, grinding machines, and power tillers. Two in five urban households have telephone landlines; while the proportion in rural areas is only one in eight. The number of households owning mobile phones is double the number of landline owners.

In Samdrup Jongkhar, 4.8% of households have a motorbike, compared to 4.6% nationwide, but 14.1% of Samdrup Jongkhar urban dwellers own a motorbike. Cars are owned by 4.6% (Bhutan: 10.2%) of Samdrup Jongkhar households (compared to 10.2% nationwide), but 15.9% of Samdrup Jongkhar urban households own a car.

Only 2.6% of Samdrup Jongkhar households own a computer, and these are mostly in urban households where 7.2% own a computer. Mobile phones are present in only 22.7% of Samdrup Jongkhar households, compared to 39.3% nationwide. But two-thirds (66%) of Samdrup Jongkhar urban households have a mobile phone.

Televisions are present in only 28.4% of Samdrup Jongkhar households (compared to 37.7% nationwide), but 75.9% of urban households in Samdrup Jongkhar own a television. VCRs, CD players, or video equipment are present in 14.4% of all Samdrup Jongkhar households, and in 36.4% of urban households. Half of all Samdrup Jongkhar

households own a radio.

Grinding machines are owned by only 2.2% of Samdrup Jongkhar households (compared to 5.3% nationwide). 69.1% of Samdrup Jongkhar households owns a wrist watch (compared to 73.2% nationwide), with the proportion again considerably higher in the dzongkhag's urban nuclei.

Power tillers exist only in three gewogs (Dewathang, Gomdar, and Phuntshothang), and in Samdrup Jongkhar town, with each gewog owning 13 of them. In all, only 0.7% of Samdrup Jongkhar households own a power tiller, compared to 3.2% nationwide. Tractors in the dzongkhag are only present in Gomdar and Phuntshothang, with each gewog again owning 13 of these. In all, only 0.4% of Samdrup Jongkhar households have a tractor, compared to 1.1% nationwide.

Distance to services

The majority of households in the country are able to reach key service centres by foot. In rural areas, the distance is generally larger than in the urban centres. In Samdrup Jongkhar, about 95% of the households are within walking distance of the nearest post office, phone, hospital or BHU, nearest tarred road, agriculture or livestock extension centre, and village temple.

The markets are generally reached by foot (91% of households) but also by a combination of vehicle and then walking for 6% of households. Half of Samdrup Jongkhar residents walk to a bus station or bus stop to access services, andone third report using some form of vehicle in addition to walking to access services.
The dzongkhag headquarters are reached on foot by only 15% of the households (i.e. those living in Samdrup Jongkhar town). Two-thirds of households walk to reach a police station and one third both walk and use a vehicle for this purpose. (Source: BLSS 2007).

Only 44% of the schools in Samdrup Jongkhar Dzongkhag have access to roads. (Source: Ministry of Education, 2010).

Transportation

Samdrup Jongkhar has 231 heavy vehicles, 477 light vehicles, and 894 two-wheelers. This corresponds to about 6% of the total number of vehicles in Bhutan.

Samdrup Jongkhar is connected with Trashigang by a highway that is presently being widened and improved, and which passes through Dewathang, Orong, and Gomdar Gewogs. A feeder road connects Samdrup Jongkhar town with the Bhangtar Drungkhag to the east. The feeder road bifurcates from the highway at Dewathang. Samdrup Jongkhar is also accessible from Phuentsholing or Gelephu by the Indian highway along the frontier. Also the Drungkhag headquarters at Daifam in the far south-east corner of the country can be reached by motorable roads via India.

About 4.5% of Bhutan's total road network passes through Samdrup Jongkhar, totaling 203 km of roadway in the dzongkhag. This includes 73.8 km of national highway, 50 km of district roads, 52.6 km of feeder roads, 7.3 km of urban roads, and 19 km of farm

roads.

Lauri Gewog is the most remote gewog in Samdrup Jongkhar, and is accessible only by mule tracks and footpaths. The distance from the nearest road-head to far-flung villages may be two days walk. A new farm road from Tokarong to Gomdar (Tsangchilo) has been constructed, and most other gewogs are connected to the national highway by feeder or farm roads.

Lack of access to a motorable road network, however, is still a big constraint to economic development in most villages. There is a road development plan to connect the national highway from Dewathang in Samdrup Jongkhar to Nganglam in Pema Gatshel. The length of that projected highway is about 105 km, of which 40 km is planned to be constructed in the 10th FYP.

For 62.6% of the people in Samdrup Jongkhar, there is no availability of public transport; for 28.7% the availability is at least once a month; for 7.4% it is at least once a week; and only 1.3% of residents have public transportation available everyday. 58.4% of the dzongkhag households considered transportation affordable. However, 100% of the households in Lauri Gewog and half of those in Martshalla and Wangphu were unsatisfied with existing transportation access. (Source: BLSS 2007). There are few vehicles in the villages, where transportation is mainly by foot or on horseback.

Since December 2011, there has been domestic air service between Paro and Yongpulla near Trashigang, but it is expensive and very sparsely used. Drukair's Paro – Guwahati – Bangkok service introduced in 2011 will however ease domestic and international transportation to and from Samdrup Jongkhar. As noted above, the distance between Guwahati airport and Samdrup Jongkhar can be covered in about 3 hours by car if there is no congestion around Guwahati, and the Paro – Guwahati flight takes only 50 minutes.

EDUCATION

Literacy

A person is considered literate if s/he can read and write in at least one language, i.e. Dzongkha, English, Lotsham etc. Literacy is deeply linked to all aspects of life and livelihood, and is unquestionably a powerful instrument for empowerment. Literature on the subject describes literacy as an essential condition for sustainable socio-economic development and a critical tool to eradicate poverty, enhance employment opportunities, advance gender equality, improve family health, conserve the environment, and promote democratic participation.

In particular, there is a close and deep interrelationship between illiteracy and poverty at the global, national, and local levels. Poverty breeds illiteracy and vice versa. Hence tackling poverty largely depends on how effectively high rates of adult illiteracy are tackled.

The overall literacy rate among the Bhutanese population 6 years and older is 56%. Thimphu has the highest literacy rate (72%; 63.1% females; 81.3% males) while Gasa has the lowest (40%; 29.3% females; 51.3% males). Three out of every four persons residing in urban areas are literate, while less than half of the rural population is literate. The government has planned to reach a national adult literacy rate of 70% by 2013.

Nationwide, the literacy rate among males (66%) is twenty percentage points higher than among females (46%). The national data show that women who have attended school, particularly in urban areas, are far less likely to be household heads than illiterate women in rural areas. Nearly 85% of urban dwelling males are literate, while only 60% of rural dwelling males are literate. Similarly, while 65% of females are literate in urban areas, only half of the women residing in rural areas are literate.

The literacy gender gap widens with age; in the 6-9 year old age group, males are only 2.6 percentage points more literate than females — a testimonial to growing gender equality in primary education in Bhutan, while in the 50-54 year age group, the literacy rate among males is 40 percentage points higher than among females. In every dzongkhag without exception, males are more likely to be literate than females — although, as noted, the gap narrows markedly in younger age groups.

In Samdrup Jongkhar the overall literacy rate is 54.8%, very close to the national average of 56%. The female literacy rate in Samdrup Jongkhar is 44.2%, and the male literacy rate is 65.4%, once again quite close to the national averages of 46% and 66% respectively.

Education system

The education system in Bhutan consists of three major dimensions: general education, monastic education, and non-formal and continuing education. The first type of education is by far the most prevalent and the most visible, and is often mistakenly seen as the only educational structure. Monastic education is actually the oldest form of education in Bhutan and was in fact the only education available in the country until the introduction of formal school-based education in the late 1950s. Students enroll in monastic education at different stages in their life.

While monastic education continues to be an important part of the national culture, western education has been promoted and expanded since the first FYP in 1961 to address tbasic educational needs, and to develop human resources required for the socio-economic development of the country.

Samdrup Jongkhar may well become a national leader in bridging the existing gap between monastic and secular formal education. Dzongsar Jamyang Khyentse Rinpoche, who started the Samdrup Jongkhar Initiative, plans to incorporate a full secular curriculum in English, Math, Science, and Social Studies into the existing monastic curriculum at the Chokyi Gyatso Institute for Buddhist Studies in Dewathang, which he directs.

Nationwide, in the formal secular education system, tthere are now 175,310 students enrolled in 573 schools and institutes spanning from community primary schools to tertiary institutes. There were 8,949 teachers and instructors excluding monastic teachers as of March 2010.

The factors contributing to the increasing enrollment are increased awareness about the value of education among parents, and also the government's policy of ensuring that all children are able to complete primary education within their own gewog.

For those (mostly adults) who could not attend or complete general or monastic education, basic literacy and post literacy courses are offered all over the country in non-formal education centers. Since 2006, the Ministry of Education in collaboration with private higher secondary schools, has initiated a continuing education program, to provide opportunity for school drop-outs and adults to upgrade their qualifications. (Source: Ministry of Education, 2010).

In Samdrup Jongkhar, there are 13 community primary schools, 5 lower secondary schools, 4 middle secondary schools, one higher secondary school, one private school, and 29 non-formal education centres. There are 2 monastic schools with 100 male pupils enrolled.

Within the 53 general education schools in Samdrup Jongkhar, 8,555 students are registered with 288 teachers. 19.2% of survey respondents have reported there are too many children per teacher. The teacher-pupil ratio in Samdrup Jongkhar is 1:27 while the national target is 1:24, though some middle secondary schools in Samdrup Jongkhar have far higher ratios and very large classes. Nationwide, the ratio distribution is very uneven among the schools, regions, and dzongkhags. For example, the teacher pupil ratio in Gasa is 1:13 while it is 1:34 in Samtse. (Source: Ministry of Education, 2010).

Due to the remoteness of many villages and their considerable distance from the nearest secondary schools, many students who continue their education past primary school must board at the schools they attend. In the 2007 Bhutan Living Standards Survey, 24.4% of respondents reported availability of boarding school facilities, while 54.1% reported not being able to board. (Source: BLSS 2007).

Traditional and Non-Formal Education (NFE)

Because the Samdrup Jongkhar Initiative is committed to GNH-based development, data on traditional and non-formal education are of particular interest, since such education may provide an important mode of transmission for traditional skills and Bhutan's ancient culture.

Nationwide, there are presently 714 NFE centers in the country with 12,901 learners and 754 instructors. The NFE programme provides training in basic literacy and functional skills to the adult population, particularly in rural areas. It has greatly contributed to increasing the literacy rate and has therefore gained widespread popularity.

It is interesting to note that participation of women in the NFE programme is high, both as instructors (61% are women) and learners (69% are women). Nationally, among females who have previously attended school, only 8.9% also received traditional, non-formal or other forms of education. But among females who have never attended school, 13.6% have received other forms of education, primarily non-formal education. This is logical, since basic literacy is a key goal of non-formal education, which is therefore often targeted to those who have never received formal schooling.

Despite the present influx of women into non-formal education programmes, past history has resulted in much higher existing rates of traditional and non-formal education among males, both with and without previous school experience. For males without previous schooling, 27.7% have also received traditional or non-formal education or are self-taught, twice the present rate among women. But presently, females are enrolling in non-formal education programmes at far higher rates than males, who tend to prefer traditional education. The present male-female gap in non-formal education statistics will therefore undoubtedly narrow over time.

Samdrup Jongkhar has 33 NFE centres with 555 learners and 38 instructors. The gender ratio for non-formal education instructors in Samdrup Jongkhar, however, does not follow the national trend: 55% of NFE instructors in Samdrup Jongkhar are men, compared to only 39% nationwide. However, 72% of NFE learners in Samdrup Jongkhar are females, compared to 69% nationwide.

Of the whole population in the dzongkhag, 12.6% have attended some form of traditional or non-formal education. The rates in the rural gewogs — Lauri, Martshala, Serthi and Wangphu Gewogs — were above 16%. The urban areas, on the contrary, showed non-formal education rates below 10%, corresponding to their higher literacy rates and greater access to formal educational facilities.

Continuous education

In order to build a system of continuous learning and to provide school leavers with an opportunity to upgrade their academic qualifications, a continuing education programme is now offered in 12 dzongkhags with a total of 1,556 learners enrolled. Males and females are equally enrolled in numbers. Unfortunately, there are no continuous education programmes in Samdrup Jongkhar.

Special education

The objective of the Special Education program is to provide access to general education in regular schools for all children with disabilities and special needs, including those with physical, mental, and other types of impairment. An inclusive approach is therefore adopted. The centres providing special education in the country are: the National Institute for the Disabled in Khaling (now renamed as National Institute for Visually Impaired), the resource centre for children with special needs (mental and physical impairments) at Changangkha LSS in Thimphu, the deaf education center at Drugyal LSS in Paro, and five other special education centres established on the Changangkha model. There are 283 students and 123 teachers in total involved in these special education programmes.

Unfortunately, there are no such special education centres in Samdrup Jongkhar. However, three of the centres are in Trashigang, relatively close to Samdrup Jongkhar Dzongkhag.

Tertiary education
There are ten different institutes that comprise the Royal University of Bhutan (RUB), with a total of 4,926 students (63% of whom are male) and 792 teachers (of whom 10% are foreigners). Females make up about 45% of the students who receive scholarships to study abroad, and about 58% of the students studying abroad without the government's financial assistance. The Jigme Namgyel Polytechnic (JNP), the engineering school of the Royal University of Bhutan, is located in Dewathang. In 2009, it had 320 students, 79% of whom are male, and a total of 75 teachers.

Vocational training As of 2010, there there were Vocational Training Institutes in the country with 804 students enrolled (of whom 67% were male). However, there are no vocational training institutes in Samdrup Jongkhar Dzongkhag. To tackle present shortages of manual work skills in fields like masonry, plumbing, etc., vocational training in these and other areas might be promoted more actively in the district.

Such an initiative would not help generate income but also assist in reducing the present flow of rural populations to urban areas. The 10th FYP has identified this opportunity and has incorporated its implementation into its programme.

The importance of vocational training in Samdrup Jongkhar is particularly referenced here as it has been repeatedly emphasized as a priority by Dzongsar Jamyang Khyentse Rinpoche, who founded the Samdrup Jongkhar Initiative. He sees such training as a way to promote the dignity of labour beyond the usual predilection for office work, and has expressed the explicit wish, for example, to see Samdrup Jongkhar become known for its highly skilled plumbers who would be in demand nationwide and even regionally.

Monastic School
The Monastic body has reported that in 2010 there were 7,363 students in 207 monastic schools and 3 nunneries nationwide under the jurisdiction of the Central Monastic body. This enrollment is significantly lower than reported in 2006, when there were 9,287 students.

This very dramatic nationwide monastic enrolment decline of more than 20% in just four years is one reason that Dzongsar Jamyang Khyentse Rinpoche intends to introduce a secular curriculum into the existing monastic education curriculum at his Chokyi Gyatso Institute in Dewathang, Samdrup Jongkhar.

Information on monasteries not administered by the central monastic body is not available in detail. The Central Monastic body has reported that in 2004, there were 5,149 learners enrolled in those monasteries not under its own jurisdiction. Since there

are far more monasteries than nunneries, it is obvious that far more boys than girls are enrolled in monastic schools. (Source: Ministry of Education, 2010).

There are two monastic schools in Samdrup Jongkhar with a total of 100 students. One is the Chökyi Gyatso Institute in Dewathang. The institute functions as a shedrup, providing the study of Buddhist philosophy as well as practice. Chökyi Gyatso Institute follows Jamyang Khyentse Wangpo's lineage. Philosophical studies include four years at the elementary level, continuing with higher studies. The syllabus contains core texts along with elective texts. Regular retreats ranging from a few months to three years are also included in the curriculum for senior students.

As noted, Dzongsar Khyentse Rinpoche's intention is to bring a secular curriculum into the monastery as well as to make the monastery totally sustainable and eco-friendly as a model for other monasteries, the region, and beyond. Already, he prohibits the use of plastic and packaged and processed foods at what are now zero-waste tsoks (ritual feasts) consisting only of freshly prepared local foods. Such innovations have the potential to revitalize monastic education and make it highly relevant to the modern world.

School Attendance

As with the literacy data reported above, formal schooling rates are much higher for urban dwellers and men than for rural communities and women. Thus, 59.1% of Bhutanese women have never attended school compared to 46.4% of men. 60.3% of rural dwellers in Bhutan have never attended school, almost double the urban rate of 31.9%. (Source: BLSS 2007).

In Samdrup Jongkhar, 55.2% of the population have never attended school. The main reasons given by Samdrup Jongkhar residents for not having attended school are being too young or too old (24.2%), lack of interest (15%), not affordable (14.2%), need to work (10.8%), and school is too far (10.8%). (Source: BLSS 2007).

Accessibility

Accessibility by road greatly facilitates the supply of goods and materials in general, and for educational purposes also greatly facilitates the movement of teachers and students. About 58% of the schools in the country have access to roads. While 94% of schools in Bumthang have road access, followed by Paro, Thimphu, and Punakha with 89%, 86% and 85% access respectively, only 25% of schools in Gasa, 30% in Zhemgang, and 35% in Pemagatshel have road connectivity. Only 44% of schools in Samdrup Jongkhar have road accessibility. (Source: Ministry of Education, 2010).

In rural areas approximately one quarter of primary school children nationwide take more than an hour to get to school, whereas in urban areas only one percent of primary school children take more than an hour.

In 2007, 42.8% of children and youth in Samdrup Jongkhar Dzongkhag needed less than 15 minutes to reach school. However, 22.3% needed more than one hour, while 18.1% needed between 15 and 30 minutes. In rural areas more time is clearly needed to reach school. For example, a high proportion of children and youth in Phuntshothang, Serthi,

and Wangphu Gewogs needed more than one hour to reach school (46.8%, 52.2% and 60.0% respectively) in 2007. The vast majority of Samdrup Jongkhar households (96.3%) do not spend money for school transportation.

A community primary school (CPS) is a primary school that caters to a specific community, which can be a village or a cluster of defined villages. All the households in the specific community contribute towards the construction and maintenance of the school. The government provides support in the form of payment for skilled labour, and construction materials that are not locally available as well as textbooks, stationery and teachers. Most of the CPSs are in remoter areas, and often lack communication and access to facilities, while most secondary schools are in larger and better connected areas.

Over 27% of primary school students in Bhutan are currently enrolled in CPSs. A little over 62% of these students (around 22,253) are enrolled in 164 schools classified as remote, very remote, or difficult. CPSs enable students to live at home and in their communities. Without CPSs, the students would have had to either walk long distances or be enrolled in boarding schools to access education.

Gross and Net Enrollment Rates

The national net enrollment rate (the proportion of children enrolled at a specified level of education divided by the total number of children in the age group specified for that particular level of education) is 51.7%. The national gross enrollment rate (the proportion of children at a specified level of education regardless of age divided by the total number of children in the age group specified for that particular level of education) is 82.1%. The difference is due in large part to the fact that older youth who had not previously received schooling are now 'catching up' by enrolling at levels below those normal for their age group.

While the net enrollment rate at the primary level is estimated at 82% nationwide, the rates at the secondary level are much lower (23%, 19%, and 11%, respectively for lower, middle, and higher secondary levels). Both gross and net enrollment rates are higher for males than females and nearly 20 percentage points higher for urban students than for rural students.

About 64% of the total school enrollment is concentrated in urban and semi-urban areas, while only 29% of schools are in these areas. This can be largely attributed to the scattered nature of settlements in rural and remote areas, and also explains the relatively high cost of providing education services in these areas. As noted, the share of the rural population (60.3%) that never attended formal schooling is nearly twice that of the urban population (31.9%).

The Samdrup Jongkhar gross and net enrollment rates of 83.6% and 50.3% respectively are roughly in line with national averages. One interesting disparity between the Samdrup Jongkhar and national gross enrollment data is the disproportionate number of Samdrup Jongkhar males enrolled at the lower secondary level □ nearly 25 percentage points higher than at the national level. This is likely due to older males in rural areas going back to school to catch up on previously missed schooling.

Somewhat fewer Samdrup Jongkhar youth are enrolled at the higher secondary school level than nationally, though it is noteworthy that this disparity shrinks when gross enrollment rates are considered, again likely indicating that older youth are going back to school to catch up on missed schooling.

School feeding

Through World Food Programme (WFP) support and a government stipend, 30% of primary students nationwide and 35% of class VII-VIII students receive meals at school. In 2010, these programs fed 2,906 students in Samdrup Jongkhar, which is 34% of the dzongkhag's school students □ in line with the national average.