

Promotion of German-Bhutan Science Co-operation in Agriculture and Rural Development

*(“Improving agricultural resource based rural livelihoods
in balance with sustainability objectives”)*

Report on the results of four online meetings in November/December 2020

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Table of Content

<u>1. INTRODUCTION</u>	<u>1</u>
1.1 BACKGROUND OF THIS REPORT	1
1.2 SPECIFIC OBJECTIVES.....	1
1.3 PROCEDURE.....	2
1.4 SUMMARY.....	2
<u>2. GOALS AND PRINCIPLES FOR AGRICULTURAL AND RURAL DEVELOPMENT IN BHUTAN</u>	<u>3</u>
2.1 GENERAL.....	3
2.2 CREATING A MORE ENABLING ENVIRONMENT: RURAL DEVELOPMENT POLICY AND ORGANIZATIONS.....	4
2.3 COMMERCIALIZATION/PRODUCTIVITY.....	5
<u>3. CNR’S HISTORY, ROLE, AND CAPACITY</u>	<u>6</u>
3.1 HISTORY, VISION AND MISSION.....	6
3.2 STUDENTS	6
3.3 STAFF.....	8
3.4 BUDGET.....	8
3.5 LINKAGES AND OUTREACH.....	8
<u>4. CNR’S IMPACT ON AGRICULTURAL AND RURAL DEVELOPMENT</u>	<u>9</u>
4.1 ACADEMIC EDUCATION.....	9
4.2 TRAINING.....	10
4.3 RESEARCH	11
4.4 ADVISORY SERVICES.....	11
4.5 STRATEGIC PLANS OF RUB AND CNR.....	12
<u>5. PROPOSALS FOR PROMOTION OF GERMAN-BHUTAN SCIENCE COOPERATION</u>	<u>13</u>
5.1 ACADEMIC EDUCATION.....	13
5.2 TRAINING.....	14
5.3 RESEARCH	14
5.4 COOPERATION INTEREST AND EXPERIENCE OF GERMAN UNIVERSITIES.....	15
5.5 DAAD INSTRUMENTS PRESENTLY AVAILABLE TO BHUTAN AND BHUTANESE.....	16
<u>6. CONCLUSIONS AND RECOMMENDATIONS.....</u>	<u>17</u>
6.1 CONCLUSIONS	17
6.2 RECOMMENDATIONS	19
<u>LIST OF APPENDICES:.....</u>	<u>21</u>
APPENDIX 1: ASSESSMENT OF ONLINE-MEETINGS	22
APPENDIX 2: SUPPORT ACTIVITIES OF GTZ	26
APPENDIX 3: REGISTRATION AND EXPORT CHANCES OF BHUTAN’S TRADITIONAL MEDICINE	29
APPENDIX 4: LIST OF ACRONYMS.....	32
APPENDIX 5: AUTHORS’ CVS (IN ALPHABETIC ORDER).....	33

1. INTRODUCTION

1.1 Background of this report

Among the wide scope of German-Bhutan relations, German-Bhutan science relations in agriculture and rural development are still rare. In recent years it was mostly driven by individual and also by DAAD-promoted activities. Between 2015 and 2019 Prof. Dr. Harald Grethe (Humboldt University of Berlin - HU) and Dr. Arndt Feuerbacher (University of Hohenheim), guided scholars from Bhutan and organized summer schools at the Royal University of Bhutan. In another instance, Mr. Tshering Samdrup graduated from HU Berlin as Erasmus Mundus scholar and wrote his master thesis in agricultural economics (2013) on Bhutan while Associate Prof. Dr. Tulsi Gurung from the College of Natural Resources came as an academic visitor to Berlin and other German academic institutions in 2017.

In July 2020, the German Bhutan Himalaya-Society (DBHG) in Germany and the German Embassy in New Delhi (DB-ND), also representing Germany in Bhutan, were informed by Matthias Weiter and Harald Grethe (both HU) about existing and possibly future ties between the Group for International Agricultural Trade and Development (IATD) of HU and the College of Natural Resources (CNR) of Royal University of Bhutan (RUB) in the field of agriculture and rural development.

Further contacts on this matter resulted in a contract between DBHG and DB-ND signed in October 2020. A German-Bhutan working group was formed to summarize the present experience of German-Bhutan cooperation in higher education and research, and to also discuss further interest and potential for continuation of this cooperation in the field of rural development.

Due to the given global health restrictions in 2020 and to limited resources, four online meetings of the expert group were scheduled in November and December 2020, the results summarized and presented to DB-ND in early 2021.

Bhutan and Germany established consular relations in 2000. Bhutan has appointed an honorary consul in Southern Germany. A Bhutanese honorary consul in Bhutan in charge of Germany has been appointed by the Ministry of Foreign Affairs / Royal Government of Bhutan (RGOB) and will be officially introduced on the occasion of the next visit of the German ambassador to Bhutan.

The Kingdom of Bhutan and the Federal Republic of Germany, wishing to strengthen and develop mutually beneficial relations between their countries and peoples, have established diplomatic relations with effect from 25 November 2020.

At the Exchange of Verbal Notes ceremony, the two Ambassadors exchanged views on areas of mutual cooperation and expressed the desire of their Governments to further deepen the friendship and cooperation between the two countries and to cooperate closely in areas of mutual benefit, especially in education, science, agriculture and technology.

1.2 Specific Objectives

1. Discuss possibilities to further extend and intensify **academic relations** between Bhutan and Germany (especially in the fields of agriculture, ecology and economy)

2. Propose ways to continue this discussion for specific **identification** of joint project proposals.
3. Test advantages and limitations of **online cooperation** between academics of the two countries

1.3 Procedure

Eight Bhutanese and German experts with practical experience in agriculture met at four moderated online meetings (that lasted on average 90-120 min each) in November and December 2020, based on a previously agreed detailed agenda. Two note-takers drafted and distributed the minutes of the meetings and distributed them before the next meeting to the participants. At two meetings, representatives with direct association and knowledge about Bhutan from the German Embassy in New Delhi (Mr. Philipp von Ritter) and at the DAAD office in New Delhi (Dr. Katja Lasch) were invited to present and discuss. In January 2021, the report was drafted, based on a previously agreed annotated table of contents, and distributed to the participants for completion and comments. The final version was edited in February 2021 and submitted to the contract partners DB-ND and DBHG.

1.4 Summary

The Kingdom of Bhutan presented with its Five-Year Plan 2018-2023 a holistic development strategy that combines **cultural, environmental, economic, and social justice objectives**. The Royal University of Bhutan in its strategic plan includes expansion of research capacities as one of its five thematic objectives. And the College of Natural Resources in its strategic plan 2019-2030 further specifies the ambitions to qualify and expand its teaching and research capacities.

Bhutan's manageable geographic area and population size, its good data availability and accessibility, and its stable governance structures, together with budgetary decentralization efforts constitute **attractive framework conditions** for an extended German-Bhutan research cooperation.

Based on CNR's cooperation requests presented in December 2020 and on previous Bhutan-German science cooperation experience, an extended cooperation could be most effective if it concentrates on **themes in agriculture (including forestry)** with the perspective to help improve the living conditions of the population in primarily rural areas of Bhutan, and in accordance with their national cultural and ecologic values.

The complexity of the situation and the variety of levels, actors, and beneficiaries involved requires an interdisciplinary programme approach, possibly named **"Improving agricultural resource based rural livelihoods in balance with sustainability objectives"** with a medium-term time horizon (2030), to be presented based on the proposals of a joint fact-finding mission.

On the German side, **Humboldt University's** Department for Agricultural Economics in Berlin in cooperation with **Eberswalde University** for Sustainable Development (a UAS) - especially their Departments for Forestry and Environment and Organic Farming and Marketing - would be able to add to a German-Bhutan science cooperation program a mix of **teaching, training, and research elements**, and also experience in **testing of results** in practice.

The relevance of such an approach and its results for countries and regions with similar situations in the Himalayas and beyond is obvious. The CNR under the RUB has the potential to develop into a **regional centre for inter- and trans-disciplinary research** in the field of sustainable rural development with direct effects on nature conservation, food security, and employment.

2. GOALS AND PRINCIPLES FOR AGRICULTURAL AND RURAL DEVELOPMENT IN BHUTAN

2.1 General

Bhutan's 12th Five Year Plan (2018 – 2023)

“The 12th Five Year Plan guideline (running from July 2018 to June 2023) is set to bring about even more well-being and Happiness for the people of Bhutan through the achievement of the Plan Objective and the Sixteen National Key Results Areas (16 NKRAs) and the adoption of greater operationalization of our timeless vision of Gross National Happiness (GNH)...

The 12th FYP Guideline takes decentralization further to the grassroots through almost doubling the share of resources to the Local Government from the plan allocation. ... *(From 30 percent of capital allocation to 50 percent.)* ... Additionally, the revised Division of Responsibilities framework also provides for greater decentralization of roles, functions and authority to the local government.”

(Quote: The then PM DASHO TSHERING TOBGAY in: Introduction to 12th FYP, 2018)

Principles

Based on practical experience with implementing previous Five-Year-Plans in Bhutan, the authors of the 12th FYP accentuated three “fundamental principles” to enhance the efficiency of its implementation: **Coordination, Consolidation, and Collaboration**. These three principles are considered cross-cutting across all sectors and actors involved in Bhutan’s development alike: government, corporations, private actors, and civil society organizations (CSO).

Consequently, the application of these principles should also guide further efforts to discuss and design future programs and projects of German-Bhutan academic cooperation.

Three fundamental Principles to Enhance Implementation Efficiency of Bhutan’s 12th FYP

“**Coordination:** Today, one of the main challenges facing the country is lack of coordination at various levels – lack of policy coordination as well as implementation coordination. As a result, conflicting laws and policies, duplication of efforts and resources continue to trouble us. Better coordination needs to begin right from planning stage through implementation and monitoring. All agencies including the local governments shall ensure that all stakeholders are duly engaged in the preparation of 12th FYP.

Consolidation: With significant investment on infrastructure facilities in the past, the focus would have to shift to an effective and efficient O&M of these infrastructures and reaping

optimal utilization. It is therefore imperative that the 12th plan focuses on consolidation and strengthening the existing socio-economic infrastructure for optimal utilization and avoid continued expansion.

Collaboration: With eventual decline in Official Development Assistance, the role of private sector and Civil Society Organizations in socio-economic development will inevitably become greater. Hence, strong collaboration with entities outside the government in terms of creating enabling environment for business and support to CSOs will be mutually beneficial. Likewise, the situation will also require strengthening cooperation in areas of mutually beneficial technical and economic cooperation with our other development partners. Also of significance to the future of our development will be the direction of regional cooperation, particularly in the context of trade, transit, and energy cooperation in South Asia. Expansion in the regional economic cooperation would give rise to new opportunities as well as competitive challenges, for which we must be prepared to respond promptly as they arise.

Quote: Bhutan 12th Five Year Plan 2018-2023, p. 15 (underlined by editor)

2.2 Creating a more enabling environment: Rural Development Policy and Organizations

“While we have very good policies, rules and regulations in place, there are problems of conflicting or overlapping provisions in some of the policies creating implementation difficulties.”

Quote: 12th FYP, p.11

Aspects raised and discussed in three online meetings:

- Concerns were raised about how previous Five Years Plans were prepared. Specific plan documents often merely reflected aspirational “shopping lists”. What is required is target-based implementation-oriented documents with calculated and provided adequate resources and involved actors.
- Over the years, many studies have been provided to promote guidelines for farmers to produce marketable fruit, spices, vegetables (like apples, potatoes, mushrooms, garlic) on a more professional level. But there was little follow up after such studies were delivered.
- Local schools and farmers’ groups should be linked to increase knowledge of agricultural potential and to encourage and qualify manpower for increased rural employment.
- The promotion of agricultural cooperatives was proposed to better organize producers and marketing of their products.
- Establishing an agriculture development bank is required to provide farmers and farmers’ cooperatives with better access to credits.
- The present historically grown and difficult to manage system of taxes (internal as well as export/import taxes) on agricultural produce needs to be reviewed, revised and simplified to enable producers to better plan and calculate their activities.

- To establish RNR export promotion agency was proposed to promote Bhutanese brands for aspiring entrepreneurs; production clusters need to be organized to assure regular supply of export markets.
- Likewise, procedures for standards, certification processes, and quality control need to be simplified and transparently communicated.
- Farming in Bhutan is still to a large extent subsistence-oriented. The land has the potential for a much higher degree of agricultural self-sufficiency. As a consequence, drafting a “Food Security and Agricultural Transformation Policy” document is required as a basic step.

2.3 Commercialization/Productivity

Aspects raised and discussed in three online meetings:

- Participants stated a general reservation to intensify agricultural production in Bhutan, both on governance and on individual level. Respect for and protection of landscape, plants, and wildlife is on the one hand an essential precondition for protection of the beauty and attractiveness of the country. On the other hand, increased productivity is a precondition for survival and well-being of the population of an independent national state. Sustainable agricultural growth is the agreed compromise. Nevertheless, traditional attitudes and existing administrative rules and regulations are sometimes too restrictive to permit increase of production and productivity.
- The institutionalization of commercialisation activities would need a special act, the parliament needs to be involved. The creation of national associations of commercial agriculture (for example Apple growers association etc.) needs to have a legal base.
- Agricultural cultivation must be considered stronger as commodities, both in respect to plant and livestock production as to tourism. Tourism broke down due to the present Corona virus pandemic, but it has potential and will come back. Therefore, CNR should also be aware of its potential effects on employment, internal migration and ecology. Value chain analysis should be enforced both in teaching and in practical training and research activities.
- In the field of forestry, German-Bhutan cooperation in the past has proved that apprehended conflicts between conservation and utilization of forestry resources can be regulated for the benefit of all actors (see Attachment 2).
- In the field of traditional medicines, an EU-funded project (between 1995 and 2008) helped to assure the sustainable supply of a growing internal market for traditional medicines in Bhutan. Beyond local needs, conditions to also export traditional Bhutan medicines turned out to be not favourable at that point (see Attachment 3).
- Intensification of agricultural production does not necessarily conflict with environmental, cultural or touristic aspects, as long as it is based on sustainability principles (sustainable commercialization). It nevertheless requires explicit commitment and action on the government and parliament side to encourage and support this process.

3. CNR'S HISTORY, ROLE, AND CAPACITY

3.1 History, Vision and Mission

History: A Natural Resources Training Institute (NRTI) was established in 1992 by the Ministry of Agriculture and Forests to train Extension Agents. With the launching of the Royal University of Bhutan (RUB) in the year 2003, the NRTI was integrated at RUB in 2004 and renamed College of Natural Resources (CNR) and started offering undergraduate programs from the year 2009. Today CNR offers undergraduate programs in BSc. Agriculture, BSc. Forestry, BSc. Animal Science, and BSc. Sustainable Development, BSc. Food Science and Technology, BSc. Environment and Climate Studies and BSc. Organic Agriculture.

CNR is also offering within the BSc programs nested diploma programs in Agriculture, Animal Science, Forestry, and Food science and Technology to increase the employment opportunities at degree and diploma level. CNR has started a Master's in Development Practice (MDP) program in 2014, and in 2015 CNR has started offering a Master in Natural Resources Management. From 2021 CNR will start offering PhD in Climate Studies.

Vision: The College of Natural Resources will strive to be a dynamic and internationally recognized center of learning that promotes GNH and sustainable development through leadership in education, research and

professional services in Agriculture, Natural Resources Management and Rural Development.

The **Mission** is to

- Offer relevant broad-based higher education in Agriculture, Natural Resources Management and Rural Development
- Serve as a resource centre for high quality professional and advisory services in the area of Agriculture, Natural Resources Management and Rural Development
- Generate knowledge through research in Agriculture, Natural Resources Management and Rural Development
- Promote academic culture infused with GNH values for intellectual and personal development.

(Source: CNR's website as of 18th January 2021)

3.2 Students

- At the end of 2020, a total of 1,040 students were enrolled at the CNR, thereof 305 in seven BSc programs, and 16 in two MSc programs. In the same year, 227 Bachelors and 9 Masters graduated at the CNR. For program specific details, see table below. The BA programme **Sustainable Development** is of special attraction to CNR applicants.

Table 1: Numbers of annual students and annual graduates related to CNR's BSc and MSc programs since 2010

Progr.	BSc Agriculture		BSc Animal Science		BSc Forestry		BSc Sustain. Devlpmt.		BSc Envirnmnt /Climate		BSc Food/ Techn.		BSc Organic Agricult.		MSc Devlpmt. Practice		MSc NatRes Mangm.	
	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G
2010	24	--	26	--	21	--	--	--	--	--	--	--	--	--	--	--	--	--
2011	31	--	21	--	32	--	--	--	--	--	--	--	--	--	--	--	--	--
2012	27	24	20	26	31	21	37	--	--	--	--	--	--	--	--	--	--	--
2013	23	30	26	21	42	32	40	--	--	--	--	--	--	--	--	--	--	--
2014	32	28	39	20	57	31	33	--	--	--	--	--	--	29	--	--	--	--
2015	30	21	26	26	27	42	33	34	34	--	--	--	--	23	--	4	--	--
2015*	31	--	31	--	36	--												
2016	40	32	36	39	35	53	53	41	38	--	--	--	--	14	28	2	--	--
2017	37	29	40	25	40	27	95	32	43	--	47	--	--	4	23	3	3	--
2018	37	--	38	--	36	--	91	32	32	30	37	--	--	8	14	2	--	--
2019	36	22	36	20	37	32	96	52	27	37	40	--	35	--	6	4	6	2
2020	37	28	35	26	40	37	91	92	30	44	36	--	35	--	9	7	7	2

*pre-service

R: number of registered students

G: number of graduates

Source: CNR (unpublished)

Aspects raised and discussed in three online meetings:

- About half of CNR graduates are employed in the government (public) sector. The Ministry of Agriculture and Forests (MoAF) also employs agricultural economists.
- However, due to the small domestic job market the job opportunities are declining over the years. Therefore, CNR is diversifying the courses and is also working towards internalisation..
- As one consequence, the Ministry of Labour and Human Resources (MoLHR) introduced a Technical and Vocational Education Training Programme (TVET). Support from Germany is requested. The German dual system (employment of apprentices by firms with a formal in-company training program, alternating with training in a TVET centre, over a period of three years, final practical and theoretical examination) requires close cooperation between state and the private sector associations (i.e. chambers of commerce and industry) to standardize and adapt the curricula, to assure quality, and to organize examinations.
- As globally observed, also, in Bhutan the social image of a diploma is considered less attractive than an academic graduation, even though an academic graduate might have less chances to find an adequate job. Modularization (enabling students to

select different modules at different training institutions over an extended time and accepting a certain number of module certificates combined as precondition for an accumulated degree) might increase the attractivity (modules selected to individual career priorities) might help to increase the attractivity and the image of diplomas.

3.3 Staff

At the end of 2020, there were 120 staff members employed at the CNR; 79 are males and 41 are females. 54 work as teachers and 66 as support staff.

3.4 Budget

CNR's budget for the study year 2020/21 amounts to approx. 100 Million Bhutan Ngultrum (1,15 Million €), of which 2% (approx. 23.000 €) are earmarked for research projects.

Aspects raised and discussed in three online meetings:

- Concern: CNR has become the most expensive college of the RUB, due to the high proportion of practical elements /field studies.
- Cost of science programs by nature are higher than programs in humanities. Unfortunately, the present distribution of funds within RUB is based on the number of students registered, not on the specific cost of the programs.

3.5 Linkages and Outreach

To cover the ambitious range of functions presented in the mission statement (see 3.1), CNR needs to know what is needed and happening in the field of natural resources, but also what is happening and needed from state organisations in order to govern and protect these resources for present and coming generations' needs.

Aspects raised and discussed in three online meetings:

- CNR's teaching, training, and research activities should also be linked to the ongoing commercialisation process. CNR needs to demonstrate its potential for expanding education and training to labour market needs, to enable students to succeed as entrepreneurs, and to encourage researchers to pro-actively offer their capacity to government offices' needs.
- Meetings between CNR faculty and the MoAF officers already take place. CNR could expand its activities as advisor to the MoAF, for research, for training needs, and for implementation of plans, based on specific consultancy studies.
- How to improve the economic and social science capacity within CNR faculty was discussed, which also needs to be broadened to cover the increasingly expected advisory services for the government in the field of food security.
- CNR over the last years has intensified its cooperation with Renewable Natural Resource (RNR) Centres in different parts of Bhutan. CNR students are increasingly involved in rural development-oriented community services in a number of rural regions.

- CNR also qualifies its students not only for domestic needs, but also for jobs on the international labour market.
- In recent years, CNR established international cooperation relations with German (Humboldt, Hohenheim, Göttingen), Italian, and Norwegian universities on student and staff exchange.

4. CNR's IMPACT ON AGRICULTURAL AND RURAL DEVELOPMENT

4.1 Academic Education

Aspects raised and discussed in three online meetings:

Economy related aspects

- At CNR today, real data are used in lectures and exercises, the possibility to borrow and adapt course material is existing and has been used; studies are linked to the situation on the ground and combined with field visits, research training and policy analysis is applied in teaching; guest lectures and summer schools have been organized, learning materials are meanwhile provided in sufficient quantity, i.e. relevant scientific journals are subscribed and accessible also to students. Entrepreneurship is taught at CNR, rounds of talks with entrepreneurs are organized. CNR presently is rated an "A" college, intends to apply for being rated "A+".
- Still economic aspects had little importance in CNR's curricula. Farm economics/business administration exists to a limited degree. Micro- and macroeconomics, involving welfare economics and related techniques such as cost-benefit analysis including the valuation of public goods, as well as market and policy analysis are limited. This strongly limits the potential of CNR graduates to support the practical design of agricultural and food policies in Bhutan. Especially, more capacity development would be helpful to support policy decisions involving complex trade-offs between the multiple objectives of the Royal Government of Bhutan (food self-sufficiency, organic production techniques, conservation objectives, maintenance of cultural landscapes, and income generation in remote areas of the country).
- Therefore, DAAD-supported summer schools (2016-2018), jointly organized in Bhutan by CNR with Hohenheim/Humboldt universities, were considered very helpful by students and faculty. The National Statistical Bureau of Bhutan was of great help to support these summer schools.
- Summer schools so far have been one-timer, they were not embedded in specific courses of CNR. Though they were inspiring events, but for attendants and lecturers of summer schools, there were no chances for a follow up. This should be improved in the future but would require integrating summer schools as a permanent element in the CNR curricula, accompanied by local capacity building among professors and scholarship programs for the exchange of students and young academic staff.

- A more long-term cooperation in the field of curriculum development in the field of economic and social sciences should also aim at using a higher proportion of nationally/regionally relevant applications (Bhutan and its sub-regions).
- Borrowing of technical, data oriented, research modules (i.e., from HU and/or UWA) could be adapted by Bhutanese economists in the long run.
- Promotion of more guest lectures, summer schools, and academic exchange programs are required.

Social science aspects

- The development of agriculture, food and environment related economic sciences should be closely integrated with the development of social sciences within CNR. Considering impressive dimensions of political and societal objectives in Bhutan, it is essential to study and understand values, attitudes and motivations of various actors in the agricultural sector which are the foundations of political objectives. Furthermore, it is important to scientifically contribute to the reconciliation of the different objectives in the design of agricultural, food and environmental policies based on a wide disciplinary background. For example, mitigating the conflict between wildlife preservation and farming in remote areas does not only involve economic considerations, but also the discussion of ethical values.
- Especially the public sector could benefit if CNR's curricula would include more agricultural, food, and environmental policy aspects. Policy makers in Bhutan must be interested to make decisions based on science-based evidence. This refers to social, economic, and legal aspects of agricultural and rural development planning and implementation, so that CNR graduates can act as interface between rural population, investors, and policy makers.

4.2 Training

('Training' understood as providing content for practical application and opportunity to practice)

Aspects raised and discussed in three online meetings:

- In a recent "Sector Advisory Meeting", MoAF agreed to support CNR in building up technical training capacities.
- CNR also runs an Entrepreneurship Development Program (EDP) that focuses on Out Of School Youth (OOSY) and school dropouts. The program is available for basic (1 month) intermediate (3 months), and advanced (6 months) courses on entrepreneurship and enterprise development. The EDP program at CNR teaches basic business ideation, product identification and development, bookkeeping, packaging, and marketing.
- Currently, farm economics and marketing are taught in the BSc programs Agriculture, Animal Science, Forestry, and Organic Agriculture.

- CNR and RUB are realizing the need to have more qualified agricultural economists and social scientists. Few colleagues are already pursuing such courses in foreign universities.
- In the long run, introducing an agricultural economics curriculum at CNR could help but current gap also needs to be filled in which training faculties abroad or in-house is required.
- In the short run, CNR's curricula have to undergo curricula revisions. That includes interdisciplinarity. In all subjects, social, economic, and policy aspects need to be integrated.

4.3 Research

Aspects raised and discussed in three online meetings:

- The Royal Government of Bhutan has recently asked CNR to do in-depth research on how to motivate young people to become more engaged in agriculture, livestock, and forestry.
- CNR should also use its research capacity to analyse ...
 - ... the potential effects of a stronger protection of domestic markets from imported agricultural products on Bhutanese farmers.
 - ... the potential to strengthen farm incomes through targeted policies rewarding farmers for the provision of public goods.
- The RUB has approved a PhD program in climate studies, which will soon be started in CNR.

4.4 Advisory services

Aspects raised and discussed in three online meetings:

- Due to CNR's efforts during recent years to expand its activities to research, the MoAF acknowledged opportunities to collaborate with CNR: CNR for analytic and research purposes has been given access to MoAF's data for analysis, and consequently CNR shared the result with MoAF for decision support.
- Recent contacts between CNR and government departments proved that Bhutan's policy makers are interested in platforms for discussion, in collecting and sharing reliable data, and in research-based testing of innovations. Policy makers want Bhutan to be better prepared for tougher times that might come.
- The different actors on policy, state, education, and business level need to take to heart that collaboration is more efficient than defensive competition.

4.5 Strategic Plans of RUB and CNR

Both RUB and CNR have established and published medium-term strategic plan with defined themes, and goals, to be followed up and evaluated based on specific quantified objectives based on indicators and timelines.

RUB Strategic Plan 2018-2030

Higher education must contribute towards the creation of a knowledge-based society where development is spurred by research, creativity and innovation, and a culture of life-long learning.

Through it, Bhutanese youth who are the country's future citizens, should be able to develop knowledge and competencies, cultivate the timeless values of kindness, compassion, and humanity, and the ability to pursue economic growth.

With its key mandates to provide higher education, research for knowledge and development, and service, the Royal University of Bhutan has a vital role to play in achieving national goals.

Since its establishment in 2003, RUB has developed physical infrastructure, operational systems and processes, new academic programs, and human capacity to meet emerging needs and challenges. Through these endeavours, RUB has created a conducive environment for Bhutanese youth to pursue higher education.

The next phase of RUB's development, as envisaged in its Strategic Plan 2018-30, will emphasize the consolidation of its efforts to provide quality learning and teaching, research, and service which are considered the sources of innovation and creative solution to national development issues.

Towards this end, RUB will continue to develop its human resource capacity, academic programs especially at the postgraduate level, and research infrastructure, and create an enabling environment that ensures excellence in student learning and achievement.

Source: Introduction to Royal University of Bhutan Strategic Plan 2018-2030 (Thimphu, April 2018)

CNR Strategic Plan 2019-2030

Mission

- To offer quality education in natural resources management and sustainable development.
- To promote research, technology, and innovation in natural resources management and sustainable development.
- To serve as a resource centre for high quality professional and advisory services in the area of natural resources management and sustainable development.
- To foster academic culture infused with Gross National Happiness values for intellectual and personal development.

Source: CNR Strategic Plan 2019-2030, p. 3

5. PROPOSALS FOR PROMOTION OF GERMAN-BHUTAN SCIENCE COOPERATION

The expert groups 4th online meeting concentrated on the presentation and discussion of 17 proposals drafted and introduced by expert group member Tulsi Gurung (see boxes 5.1, 5.2, and 5.3 below).

The proposal covers a wide range of activities on institutional, organizational and technical level, and of different subjects (macro and micro economics, technology, communication, ecology, financing, and curricula-development). All the proposals have in common that they are expected to contribute in one way or the other to increasing agricultural productivity and rural development in Bhutan. Also, all these proposals are aligned within the scope of CNRs responsibility for knowledge provision, teaching, research, and advising in the field of rural development.

The proposal reflects some of CNRs present needs, though further discussion is required to clarify, to what extent these proposals (individually or maybe only in combination) will help CNR to contribute to which objective in Bhutan's educational, economic and social development strategy. CNR might need to highlight its relevance for the future of Bhutan, also to convincingly justify its share in the national educational budget.

Beside Bhutan's interest to expand academic cooperation towards these proposals, it is understood that the interest and capacity of the German partners is also essential for setting priorities for future bilateral cooperation and selection of further projects.

5.1 Academic Education

CNR's preliminary proposals for German-Bhutan science cooperation in Agriculture and R.D. (1)

Category	Specific activities
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- | | |
|--------------------|---|
| Academic Education | <ol style="list-style-type: none">1. Review/design of agricultural economics curricula in RUB/CNR: Farm economics and Marketing are taught in BSc in Agriculture, Animal Science, Forestry and Organic Agriculture. These are 12 credit courses, i.e., 120 notional hours of teaching and learning taught in 3rd year's 1st semester.2. Entrepreneurship Development Program (EDP) in CNR: There are two types of EDP program in CNR. One is the regular one taught in all the relevant programmes and is university wide module developed by the Gedu College of Business Studies as a host institution. The review is done periodically by the host institution. The other one is the EDP programme offered to interested candidates for a duration of 4 months. Review of this short-term curriculum and training could be one area.3. According to the CNR's strategic plan, CNR and Gedu College of Business Studies (GCBS) will start a joint Master's Degree Programme on Agribusiness by 2023. Therefore, support on curriculum development will be very helpful.4. Accreditation of the programmes of CNR. If there is a possibility of linking to Accreditation bodies and supporting Accreditation of BSc in Organic Agriculture Programme. |
|--------------------|---|

5.2 Training

CNR's preliminary proposals for German-Bhutan science cooperation in Agriculture and R.D. (2):

- Both for Training and Education
5. Continuation for offering summer schools/short courses on: farm economics; welfare analysis; governance of agriculture and food, data use in science and analysis
 6. Bhutan-German Exchange program (for faculty and students)
 7. Higher Education program opportunities (scholarships) in Germany for CNR/RUB faculties/students (Masters and PhD)
 8. Accessing German Academic Exchange Services (DAAD) resources for CNR, RUB, and Bhutanese scholars

5.3 Research

CNR's Preliminary proposals for German-Bhutan science cooperation in Agriculture and R.D. (3):

- Research
9. Food security and agricultural transformation
 10. Enhancing innovative and sustainable farming practices (strategies to practice subsistence farming and making farming and related rural activities attractive for youths in Bhutan while upholding its environmental integrity)
 11. Standards and certification processes for agri-commodities
 12. Human - wildlife conflict (conservation versus economic development trade-off)
 13. Commercialization of agriculture in Bhutan
 14. Strategies to overhaul value chain development of agriculture and allied services at different nodes that could help solve the issue of low rural farm incomes in Bhutan
 15. Enhancing the weak interface between science, policy-making and practice (enhancing dialogue between scientists, farmers and policy makers)
 16. Analyse whether and in what magnitude the value of protective functions of forests would be reduced due to extraction (under different extraction scenarios)
 17. Analyse feasibility of cable crane technology incl. economic aspects

Aspects raised and discussed at the fourth online meeting:

- The curricula especially need strengthening in the field of economics and social sciences aiming at the governance of agricultural and food systems.
- Human – wildlife conflict: rapid expansion of wild boar leads to increasing losses of cultivated plants, practical and acceptable solutions have to be tested.

- Due to rural-urban migration, fertile agricultural fields are left fallow. Social and economic approaches research are required to study how life in rural areas can be made attractive for younger people.
- In all rural development and value chain related projects, participation of the local population from the very beginning is necessary, the question “who is the client?” needs to be answered in advance.
- When setting cooperation priorities, applied science approaches are more appropriate to make life and jobs in Bhutan’s rural areas more attractive in the short run.
- Referring to forestry related research proposals 13, 14, 15,16, and 17: continuation and updating of forestry mapping of all relevant areas in Bhutan is required.
- The human/wildlife and the forest extraction/conservation priority debates have not yet come to a satisfying end. Some proposals for forestry related research activities referring to this debate are included in APPENDIX 2.
- Humboldt-Universities’ agricultural economists might consider contacting for possible synergetic effects other German actors with related activities, including:
 - (a) Rostock University to exchange views on their cooperation project with RUB in analysis and modelling of Bhutan’s hydropower plants (BMZ and DAAD supported);
 - (b) Deutsche Sparkassenstiftung to learn about their running project to support the creation of a microfinance sector in Bhutan, and another project presently under investigation.
 - (c) Activities of the German Ministry for Environment within the framework of the International Climate Initiative to protect the biological diversity, and another project (under examination) about management and protection of biodiversity-landscapes under control of the NGO Royal Society for Protection of Nature.

5.4 Cooperation Interest and Experience of German Universities

- Expand international diversity of German Universities by hosting students and researchers also from Bhutan.
- Widen the academic scope of BA/MA/PhD students and researchers at German universities by encouraging Germans to apply as exchange students, lecturers and/or researchers at the RUB as partner university.
- Contribute to jointly fill research gaps in areas of relevance not only to Bhutan-specific sustainable development needs, but also to globally relevant environmental aspects.
- The very good data availability combined with the small size of the country is a chance for research projects combining questions of national relevance with high regional and institutional detail.
- Bhutan is unique in its combination of typical developing country properties (low per capita income) and aspects typically more prevalent in high-income countries (high

interest in environmental protection and animal welfare), offering interesting research perspectives.

- Political decisions in Bhutan are to a high degree driven by motives of social and environmental sustainability (potentially more than in Germany). Researching governance options to instrumentalise these objectives may be promising in terms of real-world relevance as well as transdisciplinary exchange with stakeholders including administrators and politicians.

5.5 DAAD instruments presently available to Bhutan and Bhutanese

(presented by DAAD regional representative Dr. Katja Lasch at the third online meeting)

Possibilities and instruments for widening the academic cooperation activities between Bhutan and Germany exist. DAAD main purpose is to promote the internationalization of German universities. Consequently, when applying for funds to support international cooperation activities between German and foreign universities, it is always the German partner university that has to address DAAD.

- The Bhutan summer schools jointly organized by Hohenheim resp. Humboldt University and the Royal University of Bhutan/CNR from 2016 to 2018 can be considered a constructive first step towards expanding to a wider range of Bhutan-German university cooperation.
- Moving more students in both directions can be financed.
- DAAD is presently considering to include Bhutan in the group of countries eligible Study Visits by Groups of Foreign Students.
- The DAAD Fact Finding Missions program helps German university lecturers to meet potential cooperation partners in most developing countries. The aim is to use preparatory visits to set up long-term collaboration.
- DAAD also is considering to promote German short-term lecturer(s) to be sent to Bhutan, possibly in the field of agriculture.
- DAAD also administers a program financed by the German Ministry for Education and Research (BMBF) to support the internationalization of German Universities of Applied Sciences (UAS; i.e. Hochschulen für Angewandte Wissenschaften). To be able to benefit from this, Royal University of Bhutan would have to contact and to arrange with any suitable German partner UAS.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

1. The Kingdom of **Bhutan** presented with its 12th Five-Year Plan (FYP) Guideline 2018-2023 (and is on the way to implement) a **holistic development strategy** that combines cultural, environmental, economic, and social justice objectives. **Agriculture and Rural Development** rank as high priorities. Increasing and diversifying agricultural production, both to improve national food security and to raise rural incomes is accorded high priority. **Extending education, training and research** in the field of agriculture must be considered a necessary component of reaching the envisaged FYP goals. The **Royal University of Bhutan** in its strategic plan includes expansion of research capacities as one of its five thematic objectives. The College of Natural Resources in its strategic plan 2019-2030 further specifies the ambitions to qualify and expand its teaching and **research capacities**.
2. Respect for and **protection** of landscape, plants, and wildlife is an essential reason for the protection of the beauty and attractiveness of the Kingdom of Bhutan. On the other hand, increased **productivity** is considered a necessity for future well-being of the population of an independent national state and its governing institutions. Therefore, **sustainable agricultural growth** is generally accepted as an agreed compromise between conservation and development and has a high potential to contribute to further development of Bhutan.
3. Previous German-Bhutan cooperation activities included **Forestry** (cartography and management; 1997-2002) and **Agricultural Economics** (summer schools at the Royal University of Bhutan; 2016-2018). Both activities included training, teaching, and research components. Both sides are still aware of the positive effects of these programs and consider them as **potential areas for future academic cooperation** on various levels, and of high relevance for Bhutan's future development in respect to poverty reduction, employment generation, and economic growth.
4. The Royal University of Bhutan (RUB) in March 2018 has adopted and published its **Strategic Plan 2018 – 2030**. In this document, the situation of the RUB and the impending challenges are openly labelled. Improving quality by adapting curricula to needs of the national economy and potential labour market have priority to quantitative expansion. Special attention is given to extending the research capacity of faculty members. Consequently, the funds provided for research were raised to 2% of the faculty budget. The document also highlights the necessity of extending academic **research cooperation on the international level**.
5. The **College of Natural Resources** (CNR) of the Royal University of Bhutan (rated as an "A" college, striving for an "A+") does not only offer **higher education** in Agriculture, Resources Management, and Rural Development on diploma, bachelor, and master's level, but also builds up additional knowledge in these fields through **research**. Consequently, CNR not only includes these results in lectures, but is also **active in offering information and advice** both to practitioners in the field and to policy makers in the administration.

6. Initially, close to 100% of CNR graduates were absorbed by **Bhutan's public sector**, both for extension services and for policy and administrative functions. This share considerably decreased in recent years. RUB in general and CNR specifically are aware that this employment shift must be considered in forthcoming curricular revisions. Students have to be **qualified for a wider variety of jobs**, mainly in the **private sector**. CNR is aware that this requires a higher share of **economic and social science content** in several programs' curricula, but also in qualification of academic teachers for **inter- and transdisciplinary** research methods and approaches.
7. Based on the presentations and discussion of the first three meetings, the College of Natural Resources at the fourth expert meeting presented a list of proposals for future **expansion of Bhutan-German academic exchange and cooperation** in the field of Agriculture, Forestry, and rural development. Taking into account the previous Bhutan-German science cooperation experience, an extended cooperation could be most effective if it concentrates on **themes in agriculture** (including forestry) with the perspective to help improve the **living conditions of the population** in primarily **rural areas** of Bhutan, and in accordance with their national **cultural and ecologic values**.
8. The experts discussed the proposed list and welcomed it as a helpful base for more detailed discussions on **priorities, available funds, and implementation**. The list covers a wide range of possible Bhutan-German cooperation activities. Most of the proposals concentrate on **agricultural economics**, either to directly offer more **knowledge to students**, to increase the teaching and research **capacity of lecturers**, or - when applied research projects are proposed - to improve agricultural production and thus **increase rural incomes** as well as to **reconcile utilization and conservation of natural resources**.
9. Bhutan is unique in its combination of typical developing country properties (low per capita income) with aspects usually more prevalent in high-income countries (high interest in environmental protection and animal welfare), offering **integrated multidisciplinary research perspectives**.
Bhutan's manageable geographic area and population size, its good data availability and accessibility, and its **stable governance** structures, together with budgetary decentralization efforts constitute an attractive framework for an extended Bhutan-German research cooperation.
10. In addition to that, political decisions in Bhutan are to a high degree driven by **motives of social and environmental sustainability** (potentially more than in Germany). Researching governance options to exploit these motives may be promising in terms of **real-world relevance** as well as **transdisciplinary exchange with stakeholders** including administrators and politicians.

6.2 Recommendations

1. The authors noticed an unanticipated high extent to which they **were able to build trust** among each other and to establish common professional ground to contribute to the three objectives of this report in only four online meetings of 90 - 120 minutes duration each (Assessment see APPENDIX 1). Nevertheless, if - based on this report and other sources and considerations - the German and the Bhutan side intend to promote steps towards a recognizable, effective, and sustainable cooperation between universities of both countries, this report cannot replace a proper joint **fact-finding mission**.
2. An extended Bhutan-German science cooperation can build on the **existing experience in the fields of Agricultural Economics and Forestry**, with its potential effects on rural development and employment. The reputation of the past cooperation effects still is remembered in Bhutan, and the demand for continuation in these fields recently has been underlined by the list of proposals provided and exemplified.
3. To create a **structurally sustainable effect** of science cooperation beyond the level of individual contacts and aspirations, it requires more than an increased number of academic exchange instruments for individual students and scholars. A longer lasting effect requires a concept of combination of such instruments contributing to a **jointly defined thematic program**, to which all the actors involved keep committed. Such a goal has to be operationalized by an **implementation plan**, ideally with measurable targets and indicators. A ten-year perspective subdivided in two five-year phases seems to be adequate.
4. **“Improving agricultural resource based rural livelihoods in balance with sustainability objectives”** may be a name for such a thematic program. Such a program approach could benefit from the mutual exchange of knowledge and experience of students, lecturers/researchers, and beneficiaries of target groups, be it farmers, entrepreneurs, extension workers or policy makers. **Involving all these actors and their motivations** from the very beginning in a common strategy with defined objectives could increase benefits from synergies among actors and accelerate the application of research results.
5. Such a program would involve **three main components**:
 - Widening **teaching capacity** in the field of economics and social sciences related aspects of agricultural and food systems at CNR.
 - Required elements: **summer schools**, other short-term training activities, MSc. as well as PhD **scholarships for Bhutanese** to study in Germany, short term **exchange scholarships for lecturers** in both directions, etc...
 - **Research** on the development of agriculture and forestry related rural livelihoods in balance with sustainability objectives.
 - Required elements: **“Seed money”** for financing research projects, to be distributed competitively according to certain criteria (common theme, relevance, scientific excellence, involvement of partners from Bhutan and Germany, transdisciplinarity).

- **Science communication** in the field of agriculture and food in Bhutan.
 - Required elements: **Topic centred workshops** with scientists and stakeholders in Bhutan, **Curriculum development** activities with attention to transdisciplinarity and science communication.
6. The good data availability and accessibility combined with the small size of the country with its budgetary decentralization approach is a chance for research projects to combine questions of national relevance with high local and institutional detail. Research results could therefore be of relevance for other countries and regions with similar topographic, climatic, ecologic, and social situations in the Himalayas and beyond. The CNR at the RUB could develop into a regional centre for inter- and trans-disciplinary research in the field of sustainable rural development with direct effects on nature conservation, food security and employment.
 7. Humboldt University's Department for Agricultural Economics in Berlin in cooperation with Eberswalde University for Sustainable Development (a UAS) - especially their Departments for Forestry and Environment and for Organic Farming and Marketing - would be able offer a combination of excellence in research with effective testing and application in practice.

LIST OF APPENDICES:

- (1)** Assessment of four online-meetings (Matthias Weiter)
- (2)** Case Report on Forestry (Reinhard WOLF)
- (3)** Case Report on Traditional Herbal Medicine (Irmela HARZ)
- (4)** Centre of Natural Resources: Strategic Plan 2019-2030
- (5)** List of Acronyms
- (6)** Authors' CVs

APPENDIX 1: Assessment of Online-Meetings

(compilation: Matthias Weiter)

Due to time shortages and Coronavirus-related travel restrictions in 2020/2021, the four meetings to prepare this report had to be held online. All authors were (to different degrees and using different software) sufficiently familiar with online meetings before. They agreed to use Zoom.

The assessment of the achieved results by using this communication technology was assessed along seven criteria, selected from a larger number of criteria proposed by different sources, and guided by the assumption of their relative importance for the purpose of this report. The questionnaire was sent to all participants directly after the fourth meeting. Consequently, the final report was not part of this assessment.

Criterion 1: Advance communication

It is important that before any meeting starts, the members of a meeting get conveyed a realistic idea about the results pursued, about who is interested in these results, and to what end, about who else is participating, and about how much time and preparatory effort is expected from the participants to contribute to achieving the results.

In our case, all except one of the members of the group were individually addressed and informed about the idea by telephone and/or e-mail one month before the first meeting, and consequently had decided to participate. (The eighth member was asked by one member to join the group only after the first meeting.) The time schedule was prearranged in coordination with all members. The members also received the short CVs of all members, together with the preliminary annotated agenda for all four meetings before the first meeting. The agenda was implemented as planned with only minor changes.

The minutes of the first three meetings were drafted by two note-taking members of the group and then distributed in writing by e-mail before the following meeting, so that members had a chance to comment, add, or correct before the following meeting.

Result of assessment:

<u>Criterion 1:</u>	Purpose, goal, and timing of meetings were communicated in advance				
Mark your satisfaction:	insufficient	low	sufficient	large 2	complete 5

Criterion 2: Clarification of roles

It is suggested that before meetings start all members know what is expected by them, and that they know how much time they have.

In our case, all members had both a professional background in agriculture resp. forestry and also (except for the editor) had worked in their specific fields in Bhutan before. Six members (two members at each of the first three meetings) were asked in advance to

present their professional academic experience in the topics to be discussed, based on four proposed questions, in 15 minutes each. Without the issue being broached, it was understood and respected by all members that there is no hierarchy within the group, and consequently speakers were never interrupted nor patronized.

Result of assessment:

Criterion 2:	I was aware of my function in the meeting and had the chance to contribute				
Mark your satisfaction:	insufficient	low	sufficient	large	complete 7

Criterion 3: Reliable scheduling

It is suggested that the members of a group can rely on the originally agreed schedule and timing, so that they can avoid stressful situations or overlapping with other planned activities.

In our case, the originally agreed dates of the meetings had only once to be rescheduled, but two weeks warning and coordination of a new date in accordance with all members. Two of the four meetings originally planned to last 90-minutes were extended for less than another 30 minutes, after all members had agreed to stay. Including three different time-zones (Bhutan, Western Australia, Germany) fortunately only resulted in 7 hrs time difference, we could easily agree on meeting times during everyone’s working hours.

Result of assessment:

Criterion 3:	The length of the meeting was adequate to the purpose and to the result				
Mark your satisfaction:	insufficient	low	sufficient 1	large 3	complete 3

Criterion 4: Quality of moderation

It is known that role of a moderator can become difficult, if (s)he is originally a proper member of the expert group, only volunteering to moderate, but simultaneously expected to contribute to discussions.

In our group, this was the case. Due to the harmonic atmosphere among the group members, the two members who volunteered to moderate could concentrate on the presentations and participate in discussions at the same time. Their moderation activities they could reduce to the basic formal functions.

Result of assessment:

Criterion 4:	Moderation of meetings was:				
Mark your satisfaction:	too strict	slightly strict	just adequate 5	a little loose 2	too loose

Criterion 5: Communication software

The liability of the software is crucial for any online-communication, especially when more than two persons want to communicate.

In our case, the moderators tried Skype first, but after a few short breakdowns during the first meeting, for the other three meetings the moderators changed to Zoom, with much better results.

Result of assessment:

Criterion 5:	Quality of meeting software (Zoom) used				
Mark your satisfaction:	insufficient	low	sufficient	large 2	complete 5

Criterion 6: Communication hardware (incl. local server capacity)

Sufficient capacity in communication hardware is a prerequisite for any online communication.

In our case, one or two members partially had to switch off their camera function, but this did not really interrupt or disturb the quality of the contributions of the concerned members.

Result of assessment:

Criterion 6:	My own technical equipment was:		
Mark your satisfaction:	inadequate	acceptable 1	adequate 6

Criterion 7: Overall Effectiveness

Two critical editor's remarks:

(1) the margin of options should have been expanded to a sixth interval "above 100%". Now one valid interpretation could be: "Nobodies expectation was met in total!"

(2) The question was asked after the fourth meeting, but before the draft report was distributed for comments.

Result of assessment:

Criterion 7:	Overall effectiveness: my meeting-expectations were met to a degree of ...				
Mark your satisfaction:	below 30%	30-50%	50-70%	70-90% 3	above 90% 4

Potential additional criterion: Familiarity

Common belief is that effectivity and efficiency of online meetings are higher when participants have had the opportunity to meet each other in person before.

In our case, the majority of the members had only met one or two members of the group ever before. The rather positive assessment of the quality of the meeting by the participants indicates that a high degree of familiarity is not a necessary prerequisite for a successful meeting.

Additional question:	Familiarity: Of the other seven participants, I had met in person before						
Mark number:	one 1	two 4	three 1	four 1	five	six	seven

APPENDIX 2: Support activities of GTZ

during the tenure of Reinhard Wolf as forestry expert in Punakha and Wangdue districts (1997-2002)

(Presentation by Reinhard Wolf at the second online expert meeting on 20th Nov. 2020)

Summary:

The Bhutan-German Sustainable Renewable Natural Resources (RNR) Development Project (BG-SRDP) has been implemented from August 1994 till December 2005 and had a budget of approx. 6.65 million Euro.

In the first phase, the project explored development strategies and intervention activities in three districts: Punakha, Wangdue Phodrang and Gasa. From the second phase up to the end of the project, support was given to the two districts of Punakha and Wangdue Phodrang, representing approx. 10 % of the entire country. The administrations of the two districts Punakha and Wangdue and the RNR extension services have been supported as well as the central Government in formulation of national policies. The country's decentralization efforts were hereby facilitated.

The main impacts of the project were as follows:

In the field of forestry: The project has contributed significantly to the sustainable management of the forest resources and the communities are benefiting from this. In the first two phases (and continued in the last phase) the project worked on forest management planning focusing on state managed forest management units (FMUs). Many concepts and methodologies are now integrated in the forest management planning code, which is a national standard. During the last phase, focus was on forest areas which were not yet covered by any management plan (forests outside FMUs). Local communities very much depend on these forest areas. The concept for the management of forests outside FMUs is now national policy and the first areas are being surveyed and the draft management plans have been prepared.

In the field of agriculture, livestock and rural development: The communities have now more access to markets and are better integrated into the market economy. Production on the farm has increased more than 50%, especially in areas not too far away from the roads.

The project has supported 45.2 km of physical infrastructure (feeder road, farm roads and power tiller roads) and the impact surveys shows that at least 75% of the communities benefit from this infrastructure. The establishment of 7 RNR extension centres has improved the extension delivery significantly (80% of the farmers are satisfied with the extension services).

A lot of effort and resources were provided for the support activities of GTZ in developing forestry guideline documents, such as

- Forest resources potential assessment [FRPA], 2004
- A planning guideline on Management of Forest areas outside FMU system, 2005
- Forest Management Planning of Nahi FMU
- Local Participation in Forest Management Planning - The Rapid Rural Appraisal (RRA) Exercise in the Khotokha, Forest Management Unit (KFMU), 1996

- Series of case studies on Community Forest Management as a best-practice examples in Punakha (and Bhutan)
- Community Forest Management Manuals etc.

The situation has changed between then and now. It would be interesting to find out if these instruments and publications are still relevant, used in practice, and still prove to be useful.

The recent debate in Bhutan now is about sustainable extraction and harvesting of timbers and forest products. How can we expect Bhutan farmers to actively participate in development activities in rural areas while the debate between conservation and utilization efforts has not come up with a practical compromise between both objectives?

What help can be even perfect country roads, if the human/wildlife and the forest extraction/conservation priority debates come to no satisfying end, and consequently rural livelihoods remain unattractive?

Even though of plenty of studies were produced and manuals published on management of different types of forests in Bhutan, their effects are low. It is required that studies need to be linked to all aspects of implementation (situations of the local people, to training of people, to practical trials, to research, as well as to governance and policy aspects).

Summary of on-going debate with further need to scientific verification (RW)

Pro extraction	Pro conservation	Research Questions
extraction and export of timber should be encouraged due to the pandemic taking a hit at the economy	Bhutan can gain more by protecting and conserving forests rather than extracting the resources	<ul style="list-style-type: none"> Analyse extraction potential, taking into account economic costs (high investment costs due to topography etc. Quote: Bhutan has a capacity to harvest 13 million (M) cft annually but most of them are not extractable). Analyse value of protective functions of forests Analyse, whether and in what magnitude the value of protective functions of forests would be reduced due to extraction (under different extraction scenarios)
Cable crane technology for commercial harvesting of trees, the most environmentally friendly		<ul style="list-style-type: none"> Analyse feasibility of cable crane technology incl. economic aspects
Wood as a renewable resource can substitute steel and concrete in buildings		
Overstocked forests could lead to disaster forest fires		<ul style="list-style-type: none"> Analyse this statement
	there could be challenges if we export wood products as in Nepal, locals will not be able to afford to buy them owing to competing export prices for construction and local consumption	<ul style="list-style-type: none"> Analyse, whether local consumers will be negatively affected if wood products are exported
	extraction could negatively affect critical water sources; "no evidence that pine consuming more water"	<ul style="list-style-type: none"> Analyse this statement
	keep the carbon sink; carbon trading	

APPENDIX 3: Registration and export chances of Bhutan's traditional medicine

An introduction and four answers to four questions

(Irmela Harz, presentation at Expert Group Online Meeting; Dec 04. 2020; speaking notes)

The traditional medicine is an integrated and recognized part of the formal health care services in Bhutan under the auspices of the Ministry of Health.

1. the strong tradition of herbal medicines within gSo-ba Rig-pa forms a unique opportunity to prospect for new leads for development of pharmaceuticals,
2. the availability of the traditional medicine along with biomedicine broadens the health care choices for patients, and
3. the experiences of integrating two conceptually very different health care systems within one ministry contains important managerial lessons to be learned.

LIT: Traditional Bhutanese Medicine (Gso-Ba Rig-Pa): An Integrated Part Of The Formal Health Care Services. [The Southeast Asian journal of tropical medicine and public health](#) 38(1):161-167 – February 2007 by: Phurpa Wangchuk, Dorji Wangchuk and Jens Aagaard-Hansen.

EU supported project: "cultivation of medicinal plants for traditional medicine"

EU supported projects: "cultivation of medicinal plants for traditional medicine" from 1995 to 1999; and phase II from 2006 to 2008. I was involved in both projects as the agricultural adviser to the Ministries of Health and of Education as well as for the Ministry of Agriculture (an interdisciplinary approach!).

Purpose of the EU-supported projects on traditional medicine

(1) To help guaranteeing coverage of the growing demand in traditional medicine for the population of Bhutan. All districts hospitals have one traditional medicine unit integrated into the modern clinic. Each citizen can choose where he or she wants to be treated. (2) To improve the quality of the medicinal plants, particularly the drying (which is difficult because the harvesting season falls into the monsoon). (3) To assure the sustainable collection of medicinal plants. Many of the 130 high altitude plants are rare!

Traditional medicine and the Royal University of Bhutan

After the establishment of the traditional medicine in **1967** under the Royal command, the National Institute of traditional medicine was inaugurated in **1988** as a main training center of the Physicians. It was later re-named and became as the Faculty of the Traditional Medicine (FoTM) in **2013** under Khesar Gyalpo University of Medical Sciences of Bhutan. (Department of Traditional Medicine Service, 2016). Presently, there are 85 trainees pursuing diploma in TM, Pharmacy and Bachelor degree in TM. Recently, the masters' degree in TM was offered as per the curriculum developed by the institute. See: <http://www.ftm.edu.bt/>. The gSowa rigpa curriculum at FoTM comprises of the four Tantras and other supplementary texts. The curriculum consists of 156 chapters. The medium of instruction is in Dzongkha and Choekye (classical Tibetan language).

Q1: Could your project deliver more evidence on the effectiveness of traditional medicinal plants?

Important to know that traditional medicine preparations are multi substance mixtures of 3 to 39 components (besides plants, TM contains animal parts, minerals, gemstones...). Testing the effectiveness of single components is therefore extremely difficult and does not make sense. Instead, the quality and research unit of Menjong Sorig Pharmaceuticals (Corporation Ltd. Bhutan) focuses on the standardization and quality control according to retention samples, herbarium specimen, standardization of manufacturing procedures. I believe the project has greatly contributed to the standardization of plant species. Together with William Milliken (Royal Botanic Gardens Kew) we have published Guidelines for the Identification & Collection of Medicinal Plants in Bhutan.

Example Padma 28: In 2017 Padma 28 (Padma Circosan) celebrates its 40th Anniversary of pharmaceutical authorization in Switzerland, which was the first registration in a Western country. These 40 years can be considered a success story, as this Tibetan multi-substance mixture has demonstrated the good efficacy and safety.

Q2: Did your project have any effects on increase of production and export of medicinal plants?

Bhutan is totally different to our “western” way of looking at things. Instead of increasing production, we looked at sustainable ways of collection of medicinal plants. Our aim was to supply sufficient and good quality drugs (dried herbs) to the Menjong Sorig Pharmaceutical Unit in Thimphu. The EU helped to improve the drying conditions of herbs at altitudes above 4000 m asl in Lingshi, close to the Tibetan border. This is where the high-altitude plants grow. None of the 130 species is found in abundance. Usually, plants grow in pockets with certain microclimatic conditions. We studied habitats, production potentials and developed harvest guidelines in order to assure the survival of the species & plant populations.

Concerning the export of medicinal plants, we agreed with the counterparts that we would focus on OTC products, such as herbal teas, ointments, nutraceuticals because we would have had no chance to start clinical studies of plants which are not mentioned in any of the pharmacopoeias of Europe. The most famous product in this regard that time was the Tsheringma Tea. We cultivated first class Safflower in Mongar District (now the center of hazelnut propagation) and even bought a pretty sophisticated machine, which could package the tea in sachets. Handling such a sophisticated tea packaging machine in Bhutan was challenging.

Q3: To what extend could your research project coordinate with and benefit from Bhutan scholars?

Honestly, there would have been no project without the coordination with Scholars of Bhutan. During the 1st phase of the project, Drungtsho Pema Dorji was the Head of the Institute and all the other drungtshos and smenpas. Only due to the excellent relation between Dr. Paolo Morisco, the Italian project director, who spoke Dzongkhag fluently, we had such a good & successful cooperation. As the name says, traditional medicine means conserving traditions. In Bhutan it even means handing over oral traditions from one person to the other. When I started work at the ITMS I had a counterpart who accompanied me to the collection sites in Lingshi close to the border with Tibet. With his walking stick he pointed at each of the 150 or so plants and told me the traditional name of the plant,

Drungtsho Künzang did not speak English at all. I had to learn by heart the Choekey name, the English name, and the Latin name of each medicinal plant. Choekey is a classical Sanskrit language.

Q4: Do you see any chance for marketing and export of Bhutan agricultural products to Europe?

There are some classic products which have been exported from Bhutan. Hardly anything to Europe though. As I remember there are only a couple of commodities which made it to Europe.

- Red rice – the project failed unfortunately
- Lemon grass essential oil in bulk – worked for a couple of years, but is difficult because the quantity is limited
- Swertia chirata – a very bitter herb used in alcoholic liquors
- Natural Soap – very exclusive only small quantities are exported to Germany
- Dried Flowers to Switzerland

We attempted to export Bhutanese pepper: Piper mullesua to Switzerland and also Saussurea lappa/costus/kuth. But no considerable quantities have been exported.

Why not? Limited quantity; Low quality due to lack of drying technology; Transportation difficulties.

APPENDIX 4: List of Acronyms

CNR	College of Natural Resources (at RUB)
CSO	Civil Society Organization(s)
DAAD	German Academic Exchange Service
DBHG	German-Bhutan Himalaya Society
DB-ND	German Embassy New Delhi
EDP	Entrepreneurship Development Program
FYP	Five Year Plan
GNH	Gross National Happiness (Index)
GTZ	German Agency for Technical Cooperation (since 2010: GIZ)
GIZ	German Agency for International Cooperation
HU	Humboldt-Universität zu Berlin
MoAF	Ministry of Agriculture and Forestry
MoLHR	Ministry of Labour and Human Resources
NKRA	National Key Results Areas
NRTI	Natural Resources Training Institute (later renamed CNR)
OOSI	Out of School Youth (program)
RUB	Royal University of Bhutan
RNR	Renewable Natural Resources
SDG	Sustainable Development Goals
TVET	Technical and Vocational Education
UWA	University of Western Australia (Perth)

APPENDIX 5: Authors' CVs (in alphabetic order)

Harald GRETHE

Professor at Humboldt-University of Berlin, Head of International Agricultural Trade and Development Group at Faculty of Life Sciences. Since 2013- 2020 also head of Research Council of the German Ministry of Agriculture. Founding member of EU-funded "Expert Network for Agro-Economic Modelling (ENgAGE)". MA in Agriculture at Göttingen University. PhD also there, on effects of including agricultural products in the customs union between Turkey and the EU.

Tulsi GURUNG

Dean of Academic Affairs at the College of Natural Resources, Royal University of Bhutan. Implemented there 3 summer schools 2016-2018 (DAAD funding) with the University of Hohenheim and Humboldt University. Works with ICIMOD on a collaborative research under the Resilient Mountain Solutions (RMS) initiative. Established student and staff exchange linkages (Erasmus+) with Universities of Boku (Wien) and of Padova in Italy. Graduated as Master in Horticulture from the University of Reading; UK PhD in Agriculture from Khon Kaen University in Thailand.

Irmela HARZ

Medicinal Plant Specialist since 1987 (PhD). Technical expertise in natural resources management of mountain regions & organic agriculture in Peru, Guatemala, Bhutan, Pakistan and Central Asia. Senior agricultural expert in two EU projects in Bhutan from 1995 to 1999 and 2006 to 2008 (sustainable collection and cultivation of medicinal plants for traditional medicine). Co-Founder of Bio Bhutan enterprise in 2004. Board Member German Bhutan Himalaya Society since 2014.

Om KATEL

Dean of Research and Industrial Linkages at College of Natural Resources, Royal University of Bhutan. Implemented several projects in the field of water resources mapping, resource management, student-based learning programs, climate vulnerability of humans and wildlife. These projects were funded by Oxfam, Erasmus plus, WWF, USA, DANIDA and others. Some in collaboration with Wageningen, with the IGES in Japan and the National Geographic Society. Graduated as MSc in Botany at North Bengal University, India, PhD in Nat. Res. Management at AIT, Thailand. Post-doc at Nagoya University, Japan.

Dorjee KINLAY

Agricultural Economist and former Diplomat. Resigned from his active service in 2018 as UN-FAO Country Representative in Bishkek, Kyrgyzstan. Based now in Thimphu/Bhutan as independent consultant. External supervisor for Tshering Samdrup's PhD thesis at University of Western Australia.

Tshering SAMDRUP

Work experience in finance, climate change adaptation, and rural livelihood research in Bhutan and in Nepal. MSc in agricultural economics at HU in Berlin, first degree in Economics at Sherubtse College, RU of Bhutan. Research interest in exchange rate dynamics and the impact of currency misalignment on agricultural productivity, trade, and consumption. Since 2019 PhD candidate at University of Western Australia in Perth. Topic: Analysis of motivations of Bhutan farmers to participate in hazelnut cultivation.

Matthias WEITER

Honorary Professor at Humboldt Universität zu Berlin since 2004. Independent consultant. Served for over 30 years for the German Government, for GIZ in Yemen, for the European Commission in Brussels, for UNDP in New York. Regionally specialized on the Middle East/North Africa. Sector competence in water management and higher education. MSc in Economics and Technology (Hamburg); PhD in Geography (Giessen).

Reinhard WOLF

Since 1982 forestry expert with GIZ (German International Co-operation). From 1997 until 2002 GTZ team leader of the Bhutan-German Sustainable Renewable Natural Resources (RNR) Development Project in Punakha and Wangdue Districts. Since 2002, at GIZ headquarter in Eschborn, backstopper for natural resources management projects in Asia, and specialist for forestry and climate change. Since 2015 President of German Bhutan Himalaya Society (2002 member).