1.12.1.1 Water conservation- drought and flood mitigation:

- **a.** Construction of ponds, pools and lagoons to collect water during the rainy season for irrigating crops and watering livestock. The structures are made using local materials; construction of impoundment on small water courses.
- **b.** Controlled flooding: a very old technique for conserving water and the soil which is well-suited to desert environments. During the heavy rains, part of the precipitation is absorbed by the ground and some (the proportion varies with the intensity of the precipitation and the characteristics of the soil) runs over the ground surface towards lower lying areas. This runoff can be directed onto walled plots where its impoundment between the walls promotes infiltration. The land can then be cropped, with good yields. The critical question with this technique is whether the degree of infiltration is adequate for the intended crops.
- **c.** Cultivation of large areas in order to reduce soil evaporation
- **d.** Greenhouse farming with water management
- **e.** Construction of watertight clay or tile drains and irrigation channels in order to reduce evaporation
- **f.** Construction of "qanats", underground dykes and tunnels for the transfer of subsurface water to the surface by gravity (for agriculture or consumption)
- **g.** Use of clay jars for irrigation
- **h.** Use of textiles to keep garden soil moist
- **i.** Irrigation of hillside terraces by means of channels built by the farmers along the inner edge of each terrace. The water runs along these contour-line channels from the highest to the lowest terrace
- **j.** Collection of water on house tops etc. (installation of tanks) for consumption in the desert or other areas with an inadequate water supply
- **k.** Rice-growing based on the use of surface water in the rainy season: berms some 1.5 m high are built to prevent flooding and retain the water.

8. Reference: Traditional Intellect in Disaster Risk Mitigation: Indian Outlook-Rajasthan and Bundelkhand Icons; Anil K Gupta & Anjali Singh, Indian Journal of Traditional Knowledge Vol. 10 (1), January 2011, pp. 156-166

1.12.1.2. Plant protection/ Agriculture Disaster reduction:

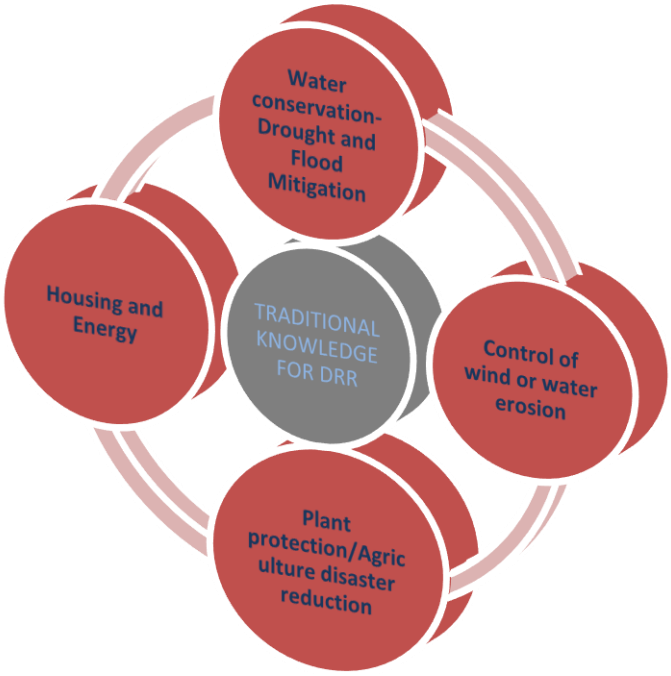
- **a.** Preservation of the natural vegetation: choosing of species to suit micro-climatic condition growing of drought and heat-resistant species growing of salt-resistant species
- **b.** Prohibition of grazing: preservation and protection of area of rangeland, especially in depression rich in alluvial deposits and forage plants
- **c.** Harvesting of spontaneous fodder and burning of land to promote re-growth
- **d.** Irrigation of crops in winter to control frost
- **e.** Use of birds (e.g. starlings) to control insects (e.g. crickets)
- **f.** Harvesting outside full-moon periods in order to minimize insect infestation
- **g.** Application of ash to plants
- **h.** Use of common, usually stronger species of plant

8. Reference: Traditional Intellect in Disaster Risk Mitigation: Indian Outlook-Rajasthan and Bundelkhand Icons; Anil K Gupta & Anjali Singh, Indian Journal of Traditional Knowledge Vol. 10 (1), January 2011, pp. 156-166

1.12.1.3 Housing and Energy

- **a.** Protection of structures (houses, equipment sheds, stable, etc.) by siting them outside natural-disaster (flood, storm, etc.) hazard zones
- **b.** Building of chimneys in houses to improve ventilation and thereby reduce summer temperatures inclusion in building of arches domes and high ceilings to keep down temperatures insulation of wall with clay or straw to keep out heat or cold construction of basements for their cooling and food-conservation capabilities making of hinged doors and windows and wooden venetian blinds to shield against solar radiation, buildings with artificial drainage systems so as to retain some moisture in dry areas
- **c.** Construction of ice pits in mountainous areas and around towns so as to be able to build up stocks of ice for the summer
- **d.** Building of dovecotes with a view to using the birds 'dropping as a manure supplement
- **e.** Use of windmills and water mills, use of solar energy, use of rice straw as fuel, use of briquetted sugar-industry waste as a household energy source (residual crop matter is dried and briquetted)
- **f.** Construction using maize or millet stalks, wheat straw, weeds and other waste. This contributes towards keeping villages clean and limiting numbers of rodent and insects

8. Reference: Traditional Intellect in Disaster Risk Mitigation: Indian Outlook-Rajasthan and Bundelkhand Icons; Anil K Gupta & Anjali Singh, Indian Journal of Traditional Knowledge Vol. 10 (1), January 2011, pp. 156-166



WATER CONSERVATION	WATER EROSION	PLANT /AGRICULTURE PROTECTION	HOUSING & ENERGY
•Construction of ponds, pools and lagoons to collect water during the rainy season •Cultivation of large areas in order to reduce soil evaporation •Green house farming with water management •Construction of watertight clay •Use of clay jars for irrigation •Use of textiles to keep garden soil moist •Collection of water on house tops (Installation of tanks)	•Creater windbreak around plots of barriers comprising trees •Erection at right angles to the prevailing work of obstacles (walls, banks, fences) •Spreading of water on land after ploughing •A simple planting scheme will help to reduce the water velocity •Use of vegetation to control erosion	•Preservation of the natural vegetation •Prohibition of grazing:- preservation and protection of areas of rangeland •Harvesting of spontaneous fodder and burning of land to promote re-growth •Irrigation of crop in winter to control frost •Use of birds (starlings) to control insects (crickets) •Harvesting outside full-moon periods in order to minimize insects infestation •Use of common, usually stronger species of plants	•Protection of structure (houses, equipment sheds, stables, etc.) •Construction of ice pits in mountainous areas •Building of dovecotes with a view to using the birds' droppings as a manure supplement •Use of windmills, water mills, solar energy, rice straw as fuel & use of briquetted sugar-industry waste as a household energy source •Construction using maize or millet stalks, wheat straw, weeds and other waste

MEDICINAL PLANTS IN AFRICA

Capsicum annuum
(Bell pepper, sweet pepper)

Chromolaena odorata
(Siam weed)

Palm Tree

Carica Papaya

Spondias mombin (Hog plum)

Chenopodium ambrosioides
(Warm wood)

Tridax procumbens
(Coat Buttons)

Ficus exasperate
(Sand paper)

Newbouldia laevis
(Boundary plant, African Border Tree)

Ocimum gratissimum
(Tea bush, African basil)

Afzelia bella
(Mahogany)

Dioscorea cayenensis
(Yellow yam)

16 medicinal plants were identified to be in common use by most of the villagers for the treatment of common diseases. Plant leaves were most commonly used relative to the other plant parts. Thirteen plant parts were identified to be used alone in the treatment of various diseases without the application of other ingredients. This shows that plants indigenous to the area possess significant medicinal properties for disease cure. The indigenous name is a reflection of the culture where the plants are mostly found and the meaning of the name was sometimes indicative of the appearance of, or use of, the plants.

23. Reference: Organic Agriculture: African Experiences in Resilience and Sustainability, Edited by Raymond Auerbach, Gunnar Rundgren and Nadia El-Hage Scialabba, Natural Resources Management and Environment Department Food and Agriculture Organization of the United Nations Rome, May 2013, E-ISBN 978-92-5-107667-5 (PDF)

1.12.5. Agriculture:

1.12.5.1. The System of Rice Intensification (SRI)

SRI is a set of alternative crop management practices, developed in Madagascar in the 1980s, to benefit farmers with small landholdings (Africare, Oxfam and WWF, 2010). It:

- increases the productivity of resources used in rice cultivation;
- helps households be more productive, secure and self-reliant;
- Has been adopted by farmers in more than 50 countries.

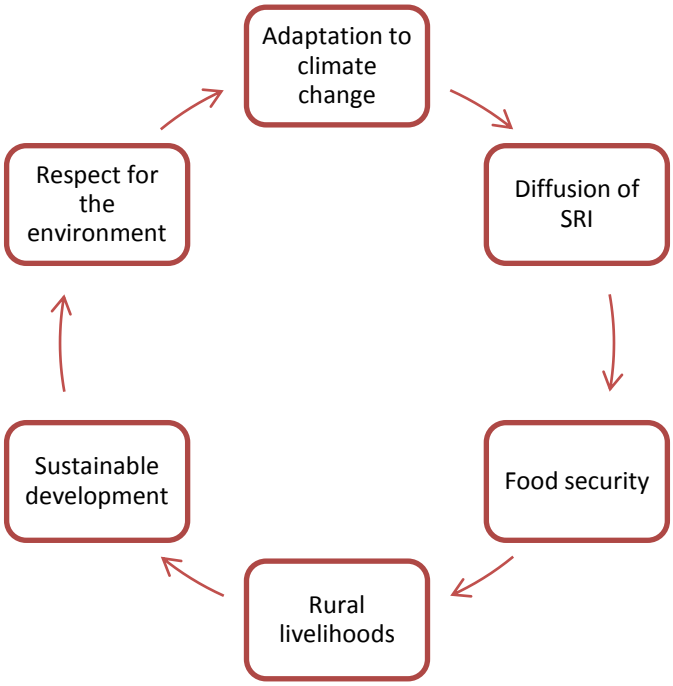
1.12.5.2. SRI has six recommended practices:

- Age of seedlings: young seedlings are transplanted at 8-12 days old ("2 leaves");
- Number of seedlings: 1-2 seedlings per hill are transplanted with shallow depth into soils that are not flooded;
- Spacing of plants: seedlings are planted in a grid pattern, 20-30 cm apart to facilitate weeding and to expose plants to sunlight;
- Water management: fields are non-flooded, with intermittent irrigation (alternate wetting and drying during the growth period);
- Soil fertilization: use of organic matter is recommended (manure, compost);
- Weed and pest control: weeding is done, often with a rotary pushed weeder, to remove weeds and aerate the soil.

23. **Reference: Organic Agriculture: African Experiences in Resilience and Sustainability, Edited by Raymond Auerbach, Gunnar Rundgren and Nadia El-Hage Scialabba, Natural Resources Management and Environment Department Food and Agriculture Organization of the United Nations Rome, May 2013, E-ISBN 978-92-5-107667-5 (PDF)**

1.12.5.3. The benefits of adopting SRI include:

- less seeds are required with SRI, therefore better quality seeds can be used;
- easier to maintain purity of rice produced with SRI;
- stronger plants and better resistance to climate conditions, pests and diseases;
- higher yields per hectare with better quality (fuller) grains;
- reduced water usage because fields are not continuously flooded;
- less pressure to convert remaining forests and natural landscapes to agriculture;
- Reductions in greenhouse gas emissions, especially methane.



The System of Rice Intensification (SRI) supports rural livelihoods through sustainable development in a way that respects the environment, helps farmers to adapt to climate change, trains them in organic production and thus improves household food security while generating increased income.

23. Reference: Organic Agriculture: African Experiences in Resilience and Sustainability, Edited by Raymond Auerbach, Gunnar Rundgren and Nadia El-Hage Scialabba, Natural Resources Management and Environment Department Food and Agriculture Organization of the United Nations Rome, May 2013, E-ISBN 978-92-5-107667-5 (PDF)

1.12.6. Indigenous knowledge (Housing):

The Kashmir region is known for its traditional earthquake safe construction practices, where two types of construction practices are prevalent: Taq system (timber laced masonry) and Dhajji-Dewari system (timber frame with infill walls).

	Types of Construction Practices	**Use Materials/Features**
Traditional Earthquake Safe Construction Practices	Taq System (timber laced masonry)	➢ Large pieces of wood or timber are used as horizontal runners embedded into the masonry walls ➢ The runners are joined together with small pieces of timber, giving the shape of a ladder laid over a wall covering two exterior faces of the wall ➢ In the local language Taq means window ➢ Piers are almost 1.5 – 2.0 feet square and the bays are about 3.5 feet wide

	Dhajji-dewari system (timber frame with infill walls)	➢ Timber frames for confining masonry in small parcels are used ➢ The most important characteristic of this type of construction is the use of lean mud mortar ➢ This system is used in the upper story walls, especially for the gable portion of the wall

24. Reference: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region, Bangkok, July 2008.

Taq System

Dhajji-dewari system

24. Reference: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region, Bangkok, July 2008.

1.12.7. Mitigate landslides through traditional knowledge:

Mitigate Landslides Through TK

- Agro Forestry
- Improving Terrace Riser
- Fencing
- Mixed and Inter croping

Instead of heavy trees, communities in the hills prefer to grow shrubs, bushes and grasses in and around the villages. Farmers perceive that small trees, shrubs and grasses in bounds and steep areas protect their farms from soil erosion and landslides.

24. Reference: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region, Bangkok, July 2008.

In areas where arable land is scarce, people have no option but to cultivate on marginal and steep lands. Most often such lands are vulnerable to landslides. However, for centuries farmers have been developing terraces on steep slopes to reduce water runoff and topsoil losses and to make crop cultivation easy.

24. Reference: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region, Bangkok, July 2008.

Fencing has been one of the most popular ways to protect standing crops from animal damage and allows plants and grasses to grow on marginal lands. Mature plants and grasses help prevent soil erosion and landslides. Two common types of fencing are dry wall fencing and bio fencing.

24. Reference: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region, Bangkok, July 2008.

Farmers in the hills as well as in Terai increase crop intensity through mixed and inter-cropping. In the hills, they plant maize with soybean or cow-pea; finger millet with masyang (black gram); wheat with potato, and so on. One of the primary objectives of intensifying crops is to increase and diversify harvest. It is also an effective method of reducing topsoil loss since it breaks the rate of surface run-off. Keeping one crop at a time means not leaving the farm fallow and uncovered. Farmers' years of experience have shown that bare fields are prone to soil erosion due to wind, water and landslides.

24. Reference: Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from Experiences in the Asia-Pacific Region, Bangkok, July 2008.