Piscicidal Plants of Nepal: Checklist, Ethnobotanical Uses and Indigenous Practices

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Introduction

Fish catching with the aid of plants and their parts is an ancient practice. The rural communities of Nepal collect piscicidal plants and their parts from various habitats, such as forest, scrub, grassland, cultivated fields, wetlands and riverbanks and use them following traditional methods and practices to stupefy fish. However, at present, the piscicidal plants and their ethenobotanical information are being eroded as a result of haphazard exploitation of resources, habitat destruction and land use change (Joshi and Joshi, 2005). The loss of traditional knowledge within cultures undergoing rapid change is just as irreversiable as the loss of species (Joshi and Joshi, 2004). Hence, priority should be given to document the useful plants and their uses along with indigenous knowledge, methods and practices. Though some ethnobotanical initiatives related to the piscicidal plants have already taken (Bhandary and Shrestha, 1982; Joshi and Joshi, 2005a; Karki and Rai, 1982; Regmi and Karna, 1989; Manandhar, 1989), less priority has been given to the systematic and comprehensive enumeration of these species and their conservation in an integrated manner. Therefore, an attempt has been made to document and enumerate the piscicidal plants with exising traditional uses and practices.

Study Areas and Methods

The ethnobotanical information were collected from the villages of the various districts of Nepal. The complex geomorphology, climatic variations and other physical characteristics make these villages rich in diverse habitats with useful species including the piscicidal plants. These areas are inhabited by different ethnic tribes, who have rich knowledge on ethnobotanical information. Ethnobotanical information was collected using various techniques and also verified with secondary sources.

Enumeration of Species

The plant species, which are reported to have piscicidal effects, are enumerated in Table 1. Seventynine piscicidal plants belonging to 35 families are arranged alphabetically by genus–species, family followed by local names, and parts of the plant used. Among the documented species, the family Fabaceae was most frequently represented with a total of 11 species, followed by Polygonaceae 7, Euphorbiaceae 6, Ateraceae 5 and others with less than 5 species.

Indigenous Knowledge and Practices

The local people have excellent knowledge of species identification, usefulness of the plants and traditional practices. Though the main occupation of villagers of the study areas is agriculture, fishing is an alternative source of income. They collect fish for food and also for sale in nearby markets. Maghi tribes are mainly involved in fishing occupation and used to utilize all parts or a certain part of the plant as fish poison. Sometimes for catching fish from rivers, the flow of water is checked either by erecting a temporary wall of mud and stones or by diverting the water current into small temporary ponds. The plant or a plant part is crushed and thrown into the water. The fish poison makes the fish float in a stupefied state and come to the surface of water from where they are easily captured.

According to the information of the local people, some species are preferred for fish poison and frequently used. These species are *Agave cantala*, *Buddleja asiatica*, *Buddleja paniculata*, *Engelhardia spicata*, *Euphorbia royleana*, *Juglans regia*, *Persicaria hydropiper*, and *Sapium insigne*.

| Botanical nante painily | | Parts | ofReferences |] |
|-------------------------|----------------------------------|---------|--------------------------------------|---------------------|
| | name | the pla | nt | |
| | | used | | |
| Acacia penn | atæreldi) Willd. | Bark, I | r Gih imere <i>et. al.</i> (2 | 000); Joshi & Joshi |
| (Fabaceae) | Arare | Stem | (2005a); | |
| | | | Manandhar (198 | 9, 2002) |
| Agave cantal | a Retukeex SalmDyck | Whole | plantndary & Shre | stha (1982, 1999); |
| (Agavaceae) | Nalu | Leaf | Joshi | |
| | | | & Joshi (2005a); | Karki & Rai |
| | | | (1982); | |
| | | | Manandhar (198 Karma (1989) | 9, 2002); Regmi & |
| Aisandra but | van wan (Roxb.) Baehni | Bark. (| Dildakendhar (1989 | |
| (Sapotacae) | | , | (| , |
| Albizia chine | nKialo(Osibisck) Merr. | Bark | Joshi & Joshi (20 | 05a) |
| (Fabaceae) | Siris | | | |
| Albizia lucidi | oPa(Sakud.) I. Nielson | Bark | Manandhar (1989 | , 2002) |
| ex Hara | Tapre siris | | | |
| (Fabaceae) | | | | |
| Anagallis arv | eAmnale, | Whole | pManandhar (1989 | , 2002) |
| (Primulaceae |) Kalo gojale | | | |
| Anemone viti | fdDhaBenchHam. ex | Whole | pManandhar (1989 | , 2002) |
| DC. | Madilo | | | |
| (Ranunculace | ae) | | | |
| Annona squa | ntsraai pha, | Leaf | Manandhar (1989 | , 2002) |
| (Annonaceae |) Banjhi | | | |
| Artemisia du | biliter platiex Besser | Leaf, Y | donkgi & Joshi (20 | 05a); |
| (Asteraceae) | Nagadamani | shoot | Siwakoti & Siwa | koti (2003) |
| Artemisia ind | i c àa n dhedjhar, | Leaf | Joshi & Joshi (20 | 05a) |
| (Asteraceae) | Titepati | | | |
| Berberis aris | talin udko. | Bark | Joshi & Joshi (20 | 05a) |
| (Berberidacea | ae) | | | (1000 1000) |
| Buddleja asi | allownhsempati, | Leaf | Bhadari & shrest | na (1982, 1999); |
| (Loganaceae) | Sano phultis | | Joshi (1991); | |
| | | | Joshi & Joshi (20 (1001)) | usa & b); Joshi |
| | | | (1991); Karlii & Dai (10 | 2). Monondhor |
| | | | $(1989 \ 2002)$ | 52); Manandhar |
| | | | (1)0), 2002) | 4 |

Table 1. Piscicidal plants of Nepal.

| Buddleja par | id Nataray a Wyzelli, | Leaf | Bhadari & Shrest | ha (1982, 1999); |
|---|---|---|---|--|
| (Loganaceae) | Phultis | | Joshi & Joshi (20 | 005a & b); Karki & |
| | | | Rai | |
| | | | (1982); Manand | har (1989, 2002) |
| Careya arbo | reKuRadalbi, | Bark, I | Leafhimere et. al. (2 | 000); Joshi & Joshi |
| (Lecythidace | ac Bhorle | Root | (2005a); | |
| | | | Manandhar (2002 |) |
| Casearia elli | <i>pfFdm</i> IW dedri | Fruit | Manandhar (1989 | , 2002) |
| (Flacoutiacea | ae) | | | |
| Casearia gra | tv Sahon A Endri | Bark, I | Lelaofs,hi & Joshi (20 | 05); |
| (Flacourtiace | ae) | Fruit | Manandhar (1989 |) |
| Cassia fistule | a R ajbriksya | Seed | Ghimere et. al. (2 | 000); Joshi (1988); |
| (Fabaceae) | | | Joshi & Joshi (20 | 05a) |
| Coriaria nep | a/BhoijinNlall. | Leaf | Joshi & Joshi (20 | 05b) |
| (Coriariaceae | e) Machino | | | |
| Croton roxbi | rghileN.P. Balakr. | Seed o | ilManandhar (2002 |) |
| (Euphorbiace | ae) | | | |
| Cyathula ton | eAtokorgRooth,) Moq. | Root | Joshi & Joshi (20 | 05a); Manandhar |
| (Amaranthac | eateankhle kuro | | (1989, 2002) | |
| Dalbergia st | ipi Tatibe rRoxb. | Root | Manandhar (1989 | , 2002) |
| (Fabaceae) | | | | |
| Daphne bhol | u KBgathpatta m. Ex | Bark, I | Lebourshi (1988); Mat | nandhar (1989, |
| D. Don. | | | 2002) | |
| (Thymelaeac | eae) | | | |
| Datura meter | Kalo dhaturo | Leaf | Joshi & Joshi (20 | 05a) |
| (Solanaceae) | | | | |
| Desmodium | a Tialogrim DC. | Stem | Mander and Chau | dhary |
| (Fabaceae) | | | | |
| Desmodium of | ofseitheause (Roxb.) H. | Bark | Ghimere et. al. (2 | 000); Manandhar |
| | | | · · · · · · · · · · · · · · · · · · · | // |
| Ohashi | Panjan, | | (2002) | |
| Ohashi (Fabaceae) | Panjan, | | (2002) | |
| Ohashi (Fabaceae) Diploknema | Panjan, buthyania (Roxb.) H.J. | Bark, (| (2002) D iMaalaa dhar (2002 | 2) |
| Ohashi (Fabaceae) Diploknema Lam. | Panjan, baljuyamia (Roxb.) H.J. | Bark, (| (2002) D Mamka dhar (2002 | |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) | Panjan, baljuganiza (Roxb.) H.J. | Bark, (| (2002) DiMamlaerdhar (2002 | 2) |
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| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace | Panjan, bræðjugauráa (Roxb.) H.J. elæbidgak Wall. ae) | Bark, G | (2002) Di Maankae dhar (2002 Lijeashi & Joshi (20 (1982); Manandhar (1989 |) 05a); Karki & Rai |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace | Panjan, bræðjuganæa (Roxb.) H.J. elfBlalgakWall. ae) raMläflanne (Roxb. ex | Bark, G Tuber, Bark | (2002) Di Maankaen dhar (2002 Licasthi & Joshi (20 (1982); Manandhar (1989 Manandhar (1989 | 2) 05a); Karki & Rai 2) 2, 2002) |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace Duabanga gu DC.) Walp. | Panjan, balayamia (Roxb.) H.J. elfBialeakWall. ae) raMaiflanne (Roxb. ex Lampate | Bark, G Tuber, Bark | (2002) Di Mamlaendhar (2002 Lleasthi & Joshi (20 (1982); Manandhar (1989 Manandhar (1989 | 2) 05a); Karki & Rai) , 2002) |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace) Duabanga gi DC.) Walp. (Sonneratiace) | Panjan, bathyana (Roxb.) H.J. chBhleakWall. ae) aMhiflame (Roxb. ex Lampate ae) | Bark, G Tuber, Bark | (2002) Di Maniaerdhar (2002 LJeasfhi & Joshi (20 (1982); Manandhar (1989 Manandhar (1989 | 2) 05a); Karki & Rai 2) 9, 2002) |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace Duabanga gi DC.) Walp. (Sonneratiace Edgeworthia | Panjan, baltana (Roxb.) H.J. chibaltana (Rox | Bark, C Tuber, Bark Bark, I | (2002) Mamlaerdhar (2002) IJeashi & Joshi (20 (1982); Manandhar (1989) Manandhar (1989) Letashi & Joshi (20) | 05a); Karki & Rai) , 2002) 05a & b); |
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| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace Duabanga gr DC.) Walp. (Sonneratiace Edgeworthia (Thymelaeace Engelhardia | Panjan, bittyyumia (Roxb.) H.J. chBlateakWall. ae) raWtiftame (Roxb. ex Lampate eae) gArdatiri (Wall.) Meisn. ea&ikalepat siMtauwi Lesch. ex | Bark, G Tuber, Bark Bark, I Young | (2002) Di Maankaen dhar (2002) Licasthi & Joshi (20 (1982); Manandhar (1989) Manandhar (1989) Lekatishi & Joshi (20 Manandhar (1989) I Catfaudhary <i>et.al</i> (| 05a); Karki & Rai) , 2002) 05a & b); , 2002) 2002); Joshi (1988); |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace Duabanga gr DC.) Walp. (Sonneratiace Edgeworthia (Thymelaeac Engelhardia Blume | Panjan, bildjuganica (Roxb.) H.J. cliBingeakWall. ae) maMiliflame (Roxb. ex Lampate cae) gArdplini (Wall.) Meisn. caki)kalepat spitauwi Lesch. ex | Bark, G Tuber, Bark Bark, I Young | (2002) Di Mamlaendhar (2002) Lleasthi & Joshi (20 (1982); Manandhar (1989) Manandhar (1989) Leasthi & Joshi (20 Manandhar (1989) Leasthi & Joshi (20 Manandhar (1989) | 05a); Karki & Rai) , 2002) 05a & b); , 2002) 2002); Joshi (1988); |
| Ohashi (Fabaceae) Diploknema Lam. (Sapotaceae) Dioscorea de (Dioscoreace) Duabanga gi DC.) Walp. (Sonneratiaco Edgeworthia (Thymelaeaco Engelhardia Blume (Juglandacea | Panjan, bitiyamia (Roxb.) H.J. bitiyamia (Roxb.) H.J | Bark, G Tuber, Bark Bark, I Young | (2002) Di Mamlaendhar (2002) Lijeasthi & Joshi (200 (1982); Manandhar (1989) Manandhar (1989) Lefatfshi & Joshi (200 Manandhar (1989) Lefatfaudhary <i>et.al</i> (Joshi & Joshi (2005a); Jo | (05a); Karki & Rai (05a & b); (2002) (05a & b); (2002); Joshi (1988); (shi (1991); |
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| (Rubiaceae) Boki labara | |
| Holarrhena nukurchis (Ruch -Ham) | Stem I Jashi & Joshi (2005a) |
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| wan. ex G. pondrajau | |
| (Apocynaceae) | |
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| (Umbelliferae) | |
| Jatropha curca Saliwa. | Whole plashi & Joshi (2005a) |
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| | $\begin{cases} (1,2,2,3,2,3,2,2,3,1,2,2,2,3,1,2,2,2,3,1,2,2,2,2$ |
| | (1000). |
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| Lusea cubeba Silouni)rPers. | Bark, Lesanwakoti & Siwakoti (2003) |
| (Lauraceae) | Fruit |
| Lyonia ovalifoliangWall.) Drude | Young leafhetri & Joshi (2002); Joshi |
| (Ericaceae) | Joshi & Joshi (2005a) |
| Madhuca long Mading (Maching) | Bark Di Mamlan dhar (1989 2002) |
| Machride | Surr, Primum (1901, 2002) |
| (Sapotaceae) | |
| (Sapulaced) | |
| Maesa argentet (nogate.) A. DC. | Leat Manandhar (1989, 2002) |
| (Myrsinaceae) | |
| Maesa chisia BithuriHam. ex D. | Root, Barkshi & Joshi (2005a); |
| Don. Thinke | Leaf Manandhar (1989, 2002) |
| (Myrsinaceae) | |
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| | Manandhar |
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| Melia azedaraBakaino | Fruit Joshi & Joshi (2005a) |
| (Meliaceae) | |
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| (Polygonaceae) | |
| Persicaria gla Seato (Wield.) M. | Whole Man andhar (2002) |
| Gomez | |
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| (Polygonacege) | |
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| (Polygonaceae Katnaulo | (2000-2001) |
| | Joshi & Joshi (2005a & b); Karki |
| | Rai (1982); |
| | Manandhar (1989, 2002); Regmi |
| | Karna (1989); |
| | Siwakoti & Siwakoti (2003) |
| Persicaria lan Brisinaliki (ihars F. Grav | leaf Siwakoti <i>et al.</i> (2005) |
| (Polygonaceae) | iour biwakou ci.u. (2005) |
| Densis anima (Cotto side) Hore | <u><u> </u></u> |
| Persicaria publication (BIL) Hara | whole plan and ar (1989, 2002) |
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| Nakai | (1989) |
| (Polygonaceae) | |
| Phyllanthus ur Annaira Ihar. | Whole nDantgol (2000-2001) |
| (Funhorbiacea@)iata | |
| Dhui Amelo | |
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| Piptanthus nepsugasphuHook) D. | Bark, Levinanandnar (1989, 2002) |
| Don. Siksike | |
| (Fabaceae) | |
| Plumeria rubr Ehu wa, | Bark Manandhar (1989, 2002) |
| (Apocynaceae)Golaichi | |
| Ricinus communicater. | Leaf, Setoshi & Joshi (2005a &b); |
| (Euphorbiacea@ndi | |
| Rhododendron with Gratans Sm | Young last i & Joshi (2005h). Manandh |
| (Fricaceae) | (1989-2002) |
| (Effedeede) | (1969, 2002) |
| Pubia maniith Dlouib hay Eloming | Whole plenki & Loshi (2005a); |
| (Dubiasses) | whole present & Joshi (2005a), |
| (Rublaceae) | |
| Sapium insighe K(Hargal) | Bark, leathandary & Shrestha (1982, 199 |
| Benth. ex Hook. F. | Joshi & Joshi (2005a); Karki & F |
| (Euphorbiaceae) | (1982); |
| | Manandhar (1989, 2002) |
| Sapindus mukakithai Gaertn. | Fruit Regmi & Karma (1989) |
| (Sapindaceae) | |
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| (Ulmaceae) | | | |
| Verbascum th | a puchhar | Whole | p Man andhar (1989, 2002) |
| (Srophulariac | eae) | | |
| Xeromphis sp | <i>ii</i> Main(ji Ihainb.) Keay | Bark, | Dangol and Gurung (1999), Gurung, |
| (Rubiaceae) | | Ripen | fr Dia ngol |
| | | | & Bhandary (1999); Manandhar |
| | | | (1989) |
| Zanthoxylum | arimany DC | Bark, l | eafoshi & Joshi (2005a); Regmi and |
| (Rutaceae) | Bhale Timur | | Karna (1989); |
| | | | Manandhar (1989, 2002) |

Strategies for Sustainable Management

The following strategies are recommended for sustainable management of useful plant diversity.

1. Inventory, Chemical Screening and Documentation of the Species

Many parts of the biogeographical areas of the country have still remained unexplored. Hence, it is strongly recommended that major thrust should be given to an intensive inventory and documentation of piscicidal plants and their products. Emphasis should also be given to analyse chemical components of the plants and the parts which are used to stupefy fishes. A more systematic investigation of some of these plants may lead to the discovery of new economically useful products.

2. Documentation of Traditional information, methods and practices

The rural people have developed unique indigenous knowledge related to the uses of plant resources due to constant association with the forests. These existing valuable information are needed to be documented before lost or disappeared. As there is lake of the documentation system, priority should be given to develop a system for the systematic recording of the information related to the ethnobotanical uses and indigenous knowledge of the species.

3. Conservation of useful species and their habitats

Though forests, scrubs, grasslands and waste lands are the major habitats of the pecicidal plants, most of them appear to be restricted only to shaded forest habitats. An obvious conclusion that can be drawn from this picture is that deforestation and habitat destruction due to land use change would pose a serious threat to the species. Even without tree-removal, extensive grazing of domestic animals in the forests can be damaging to some species. When questioned about the changing status of the existing plants, our respondents listed some important species such as *Coriaria nepalensis, Sapium insigne* and *Zanthoxylum armatum* which have also declined in abundance during the last decade. The trend of decline of abundance of the useful species shows that action for conservation is urgently needed. Hence, efforts should be directed to formulate and implement appropriate strategies and programs related to the conservation and sustainable uses of these plants and their products taking consideration of the needs of the people.

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