



Research article

Incorporating permaculture and strategic management for sustainable ecological resource management



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ABSTRACT

Utilization of natural assets to the best efficient level without changing natural balance has become a critical issue for researchers as awareness on climate change takes central position in global debate. Conventional sustainable resource management systems are based on neoclassical economic approach that ignores the nature's pattern and therefore are not actually capable of sustainable management of resources. Environmentalists are lately advocating incorporation of Permaculture as holistic approach based on ethics, equitable interaction with eco-systems to obtain sustainability. The paper integrates philosophy of permaculture with strategic management frameworks to develop a pragmatic tool for policy development. The policy design tool augments management tasks by integrating recording of natural assets, monitoring of key performance indicators and integration of sectorial policies in real time, bringing out policy as a truly live document. The tool enhances the edifice process, balancing short term viewpoints and long term development to secure renewability of natural resources.

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1. Need for natural resources management

Natural Resources Management (NRM) refers to the sustainable utilization of natural resources, such as land, water, air, minerals, forests, fisheries, wild flora and fauna etc. Natural Resources (NR) provide fundamental life support, in the form of both consumptive and public-good services. The ecological systems such as sustain soil efficiency, nutrient recycling, the cleaning of air and water, and climatic cycles are the fundamental factors in the management of the natural resources. It had been recognized that people and their livelihoods depend on the health and productivity of landscapes, and their actions as stewards of the land that plays a critical role in maintaining the health and productivity of the eco-system (Daly, 1990; Prell et al., 2013; Khan et al., 2014). Altogether, these resources provide the ecosystem services that underpin human life.

The natural resources are coming under increase pressure due to

rise in population and higher levels of per-capita economic activities. The estimation given by World Bank (2000) indicates that in 2030 the expected rate of the world's population is likely to be 3.7 billion. In which ninety percent of population increase will occur in developing countries. In 1990 most people lived in rural areas, but by 2030 the urban population will be twice the size of the rural population. The cities in developing countries are expected to grow by 160 percent over this period, whereas rural populations will grow by only 10 percent. The distributions of people between rural and urban areas have important implications for the types of pressure placed on the economy and environment. Changing demographics and social values bring new challenges in utilizing natural resources that are becoming competing and often conflicting (Osborn, 2013; Khan et al., 2015). Therefore, urbanization brings serious impacts on ecosystem structure and function (Horsthemke, 2009; Bety and Godfred, 2013). The role of natural resource management in national strategic planning is gaining importance and policy makers are exploring new ways to improve their planning processes (Bruyninckx, 2004; Brouckerhoff, 2008). Therefore new policy planning tools are required for the sustainability to preserve the natural resources.

In this study Permaculture is used to methodically design a

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theoretical framework for the analysis of systems development. Permaculture is based on ethics, equitable interaction with environment, a system design principles of sustainability and offers an unequivocal vision and strategy for valid sustainable management (McEwan and Goodman, 2010). Permaculture theory as a system development tool will work well with natural resources management's policy; which has benefits both as a theoretical exercise and a practical instrument (McManus, 2010). It is also an appropriate approach to use in understanding and solving of the problems involving in the arena of socio-economic development and associated environmental problems (Paull, 2011). In this context, Permaculture theory has the ability to efficiently handle the issues and challenges in designing sustainable natural resource management system. Designed framework tool based on Permaculture theory's perspective can be distinguished by providing a means for observing the patterns of human activity in terms of achieving targets, goals and purposes, facts, awareness, focus of attention and tools through analyzing natural resources data. Therefore designed sustainability assessment Policy Framework proved useful information about natural resources not only in understanding user group activities in their development of any system, but also allowed a multi-faceted analysis of the information and its users and the nature dynamics between them.

2. Permaculture as new approach

Mollison (2002) defined Permaculture as: a philosophy of functioning with, rather than against nature; of prolonged and solicitous observation rather than extended and inconsiderate labour; of looking at flora and fauna in all their functions, rather than care for any vicinity as a single-product system. This description of Permaculture conveys a central idea in Permaculture following and exploration of nature's pattern. The term Permaculture is an ellipsis of the words permanent, agriculture, and culture. In the beginning of 1980's, the notion of Permaculture had extended from farming systems design toward sustainable human habitats.

The Permaculture observed how natural system work and how the natural system loses its balance. There are three guiding principles on which the Permaculture paradigm is based. First, each component of the system carries out various functions. Second, each preferred function of the system is maintained by multiple components. Thirdly, everything in the system is interrelated to everything else. Every element of the system perform significant tasks such as, birds help to pest control, plants drag nitrogen out of the atmosphere and stick it into a procedure that further plants can utilize. Further, natural ecosystems reprocess their own wastes and all the various elements of a nature work collectively, such as wetlands and forests are sustainable and they fulfill their own energy requirements. It is imperative, as the weakness and productivity of a system depend not on the amount of components it restrains, but relatively how many interactions take place within the system. Therefore all the elements do their valuable work in harmony to produce a constructive living based solution on the patterns it had observed in the nature. Permaculture identifies that all living organisms have particular niches of space, time and actions. All should work within the specific niches and within these niches exist a subtle equilibrium and relation between living organisms (Akhtar et al., 2014).

Permaculture is a coherent and explicit set of design and is an ecological development system that mingles aboriginal awareness with suitable technology and supports the concept of "the Spiral of Intervention". This concept deal with the inspiration that nature should sprint its itinerary and minimum human intrusion is best course of action. It is a dynamic philosophy that expands the idea of "minimum effort, more effect". Western-industrial culture is

wedged with the approach that the more physical work and control over milieu that the worker commences; the more proficient and productive that work will be. Basically Permaculture is about producing valuable interaction between individual rudiments (Akhtar et al., 2015).

3. Permaculture ethics

Permaculture is a consciously planned system which imitates the pattern and interaction establish in nature and integrate sustainable management practices. It focuses; ethical and design principles that provide a framework for the Permaculture approach (Mogen, 2006; King, 2008). The ethics and principles of Permaculture are concise declaration that is global and the techniques that convey these principles will differ according to area and state (Holmgren, 2002). In the absence of any global ethical strategy concerning the environment in the modern world, Permaculture provides a convincing relationship between ethics and the well-being of the environment (Burnett, 2008; Bellacasa, 2010). The three ethical guidelines of Permaculture are as follows:

- Care for Earth
- Care for People
- Fair Share/Setting Limits to Population and Consumption.

From each of these ethics flow numerous moral functions, but the basis relics the similar. The first ethic "Care of Earth" is bound to develop and permeate all aspects of Permaculture. It focuses on provisions for all eco-systems to continue and multiply because without a healthy earth, human beings cannot flourish. Second ethic is "Care for People" means fulfilling people's essential requirements for their existence, so that people's lives can be sustained by living a good quality life without damaging the earth. The third and the last ethic "Fair Share" is the combination of the first two ethics. It recognized that human being had to share all renewable and non-renewable resources with all other living organisms and save the resources for future generations (Mollison and Slay, 1991).

There is no system to design a sustainable society without establishing the equity as others suffer without clean air, water, food, protection, significant employment etc. The vital consideration of Permaculture is to provide a fully functioning and well planned design where due to effect of overpopulation the family bear a large number of dependents, making time and energy for household fuel, fodder and food production (Smith et al., 2007; Ingwe et al., 2010). Permaculture basically discards the industrial development model of the North, which is at the core of its ethics, and seeks to design fairer, impartial systems that take into relation the limits of the natural assets and the requirements of all living organisms (Seghezze, 2009; Imran et al., 2014). The key objectives of Permaculture are environmental flexibility and vital rehabilitation which makes it suitable for over-exploited, marginal and degraded soils and water areas (James and Joshua, 2008).

4. Strategic management approach used in developing PMPC

Sustainable Management has various wide dimensions effects dealing with managerial, financial, legal, societal, scientific, ecological, spiritual and cultural features correlated with natural resources. The searching for equal integration of social, economic and ecological features of sustainability has been a challenge within the environmental managers and scientific community. Numerous countries are implementing land-administration reforms combined with market-based land reforms, in which communal tenure and common-property regimes may figure as importantly as

individual or corporate title. It would be difficult to achieve sustainable solutions and input to long-term development in these countries, without the equal integration of various dimensions of management plans (Barkemeyer et al., 2014). The continuous evaluation of the requirements, expectations, to stop natural assets depletion and promote their sustainability, the resource management requires new thoughts in management plans. Several strands of work are required to gain sustainability in natural resource management such as individual capacity building, provision of basic information and training, building of social capital, and support for honest and transparent institutions that have the confidence of the local population. The new management plans are integrated on innovative approaches, means, measures, concern to modifications and consider simultaneously all capacities of the resources, needs and demands of all stakeholders (Prell et al., 2013).

Changing from responsive to practical strategic management, a new, holistic and rigor system of measures is presented on topmost of the traditional environmental management system. The well-structured ecological, economic and social perspectives and systematic monitoring, recording and assessment measures are the need for strategy management and control. Researchers such as Klassen and McLaughlin (1996), King and Lenox (2001), and Koner and Cohen (2001) indicate that better environmental management can lead to better economic development; with less pollution have a higher financial performance. The following are the approaches used for the developments for PMPC tool for the resource management.

4.1. The Balanced Scorecard: developing permaculture perspectives

Researchers such as Johnson (1998), Figge et al. (2002) and Dias-Sardinha et al. (2002) consider that the Basic Scorecard (Kaplan and Norton, 1996) could be utilized as a strategic tool for strategic management of natural assets. Not only it can be employs in the assortment and development of environmental management assessment measures, but also be used to integrate the different approaches of ecosystem management of natural assets into the implementation of the real sustainable development strategy. When facing future environmental issues, many countries consider it more practical environmental strategy in the near future (Hsu and Liu, 2010). The four perspectives of BSC (Pecuniary, Internal Business Processes, Learning and Growth and Consumer) and ethics of Permaculture features of sustainability are correlated and causal mutually to form the representation of sustainable NRM strategy and assessment. Therefore BSC strongly endorse a structure to simplify a proactive sustainable management evaluation tool.

The four perspectives of BSC structure and perspectives of Permaculture are integrated to support, and proposals for the monitoring and assessment of sustainable management. By integration of PC and BSC; the environmental managers can pick their own set of progress measures based on the management importance e.g. goal, target, and initiative for each perspective could be determined including allied stakeholders. Conventional sustainable environmental management does not cover all the perspectives. For example, site design and redesign viewpoint has not been highlighted for long-term performance and effects. The advantages of adopting BSC in environmental strategic management and assessment include the following: a) Provide perspectives and complete progress monitoring measures, b) offer an effective evaluation and monitoring system and tool, c) take care of ecological, social and economic development in a “balanced” way, d) implement BSC and create synergy with other strategic management tools.

4.2. The Intangible Asset Monitor (IAM): developing performance indicators

Sveiby (1997) also designed a conceptual framework (Intangible Asset Monitor) based on three measures of intangible assets: external structure (brands, stakeholder's relationships); internal structure (the management, legal structure of institution etc.) and individual competence (qualification, skills). The main aim of measuring these three indicators is to provide management control. He argued that money have to stop being used as an alternative for human effort and a traditional accounting system must be altered with a system of intangible assets and non-fiscal information flows (Bontis et al., 2000; Bontis, 2002, 2004; Malhotra, 2003). In IAM both financial and non-financial measures can easily be incorporated and present a comprehensive picture of economic development. The strategic management tool, IAM also be utilized through modifications to record nation's resources extensively (Lodhi and Makki, 2010).

Integration of IAM and PC provides a technique, in which the tangible & intangible indicators of PC policy perspectives are utilized according to the managerial strategy and also identify the critical success factors (CSF) of policies or lowering of assets. It could be incorporated in the information structure and cascaded to diverse management levels. When modified Intangible Asset Monitor implemented at the national level that records complete resources of a nation as a sum of intangible and tangible resources. It is a single page document; however it can be appendage by a descriptive manuscript. It not only provides the information about the availability of assets but also monitor the utilization efficiency of resources and at the same time it attempt to reduce risks of dropping these resources by indicating CSF of policies. As IAM emphasize on intangible indicators for comprehensive evaluation of natural assets, in a similar.

4.3. The Policy Matrix (PM): ensuring policy integration

Policy Matrix (PM) as planning tools systematize various goals, observations, and proposals that come from several international and national stakeholders directly concerned in determining sector policies and planning. The PM provides evaluation system to assess at what level and how the strategies are implemented for that reasons it can be utilized as reference document throughout the enactment of policies. The initiatives that are incorporated in PM emphasized on significant activities and on indicators. The actions required to achieve the strategy goals are based on viability in expressions of programming, monitoring and management accountabilities (i.e. deadline to attain the targets, nature of indicators and perspectives). Most significantly, PM helps to ensure that obligation on particular policy actions is achievable.

Like Policy Matrix, Permaculture ensures that aim and target on particular policy directives are logical, in order to achieve the targets mandatory actions are practicable and monitoring is feasible to ensure that implementation of policy reform is on the precise way. It also includes policy modifications and tangible strategy objectives which are definite, established on analysis of the site conditions of specific sector and concentrated consultation between stakeholders.

PM when integrated with PC, it provides managers to benefit from not simply monitor the sustainability of natural assets and their policies, but concurrently also scrutinize their means of verification of the strategies. The tangible and actionable policy initiatives are established on analysis of the site conditions of specific sector and concentrated consultation between stakeholders. These policy initiatives can be monitored and modified after the utilization of means of verification. As in PC the site design

will be developed after the analysis of zones, social, economic and ecological perspectives for the proper placement of diverse elements. The established site design can be re-viewed in the light of the provided information to deliver new strategies to improve the operation. A cycle of analysis, design, implementation, evaluation and re-planning is utilized to achieve sustainable natural resource management. Integration of Policy Matrix (PM) and PC provides a long-term technique which could be incorporated in the information structure and cascaded at national level as well as at decentralized level.

5. Strategy management tool (PMPC) for natural resource management

A strategic management tool planned with the integration of PC and on the rational of BSC, IAM and PM is proposed that can be implemented for management of natural assets at national level. The tool can be easily implemented for sustainable economic, social and ecological development along with accomplishment of natural reserves management policy. There are basically three possibilities to integrate strategy management tools into PMPC tool. First, environmental and social aspects can be integrated within standards perspectives of the existing strategy management tools. Second, an additional perspective of intangible indicators can be added to take sustainability aspects into account. Third, an ecologically sustainable strategy management tool can be formulated. Decision makers can modify their policies or provide new directions in the light of periodic monitoring of the indicators of the social, economic and ecological perspectives. The monitoring of indicators depends on the nature and situation of the indicators but can be monitored after every six months or a year periodically, so that the policy reforms can be reassessed and modified. This will guarantee that the policy established remains effective. The PMPC as a single page live document aims to attain balance between the social, economic and ecological perspectives for policy reforms to gain sustainability. The proposed PMPC is applied in the forest sector and presented in Fig. 1.

The columns of PMPC shown Fig. 1 is planned to cater for five

facets concerning natural resource management in a country. The first column in Fig. 1 lists the natural resources capital stocks as natural asset that could be sustained for future generation's well-being, including social, economic and ecological perspectives. The second column shows the availability of the specific asset, followed by the utilization figure, by giving various ranges or standards of indicators and the policy initiative underutilization. Threats which indicates or focus on pressures that can reduce the efficiency of policy initiatives or the exhaustion of the asset. The next section provides social, economic and ecological policy perspectives for sustainable management and the last two columns provide progress monitoring mechanism of policy reforms.

First of all, PMPC records the status of natural asserts reserves exist in the country. These assets should be recorded in measurable or quantifying units need not to be accounted in a money value specifically. Information on the extent of particular natural resource that is being exploited is recorded, providing total stocks depiction of the resource. The facts on utilization or consumption of the resources are also monitored, which provides a flow picture of the resources. Decision makers can have basic facts and figures about the state's position concerning its natural resources from these records. They can judge which resources are over-exploited and over-consumed and which are still reserved.

5.1. Policy perspectives for sustainable management

The second facet of the PMPC is future oriented, and to make sure that the decision makers are conscious and constantly observing the socially, economic and ecological perspectives of sustainability of natural assets. The tangible and intangible indicators are established for this facet. Facts and figures on these perspectives will be gathered from the tangible and intangible indicators under each head and these indicators should be resource specific. There is lack of awareness of the intangible benefits of natural resources; as a result stress on natural assets will increase further. Analysis of this segment will provide information to policy makers about the consumption of its marketed natural assets, and observes the risks to the natural capitals and the critical success

National Accounts for Natural Assets							
Account No. 01 Name asset : - Forests (for example)				Progress Monitoring			
		Standards	Policy Initiatives for SFM	CSF	Targets Dec 2016	Progress Sep 2017	Means of Verification
Available Assets		Total area of Pakistan: 10664 hc	Guideline from National Development Plan <ul style="list-style-type: none"> Increased in area under forest Conservation of forest ecosystem and biodiversity Sustainable management		Qualitative & Quantitative		International, National, Local research reports and papers
Utilization		Area managed - hectares	Guideline from National Development Plan <ul style="list-style-type: none"> Sustainable Management progress 				
Policy Perspectives for Sustainable	Care for earth	Ecological Indicators					
	Care for People	Social Indicators					
	Fair Share	Economic Indicators					

Fig. 1. Sustainable Management through Policy Matrix applying Permaculture (PMPC). Source compiled.

factors faced in implication of policy directives. It will also give information on the sustainability of the natural assets. The indicators established for the section will warn, if the sustainability of the asset is low.

5.2. Standards

Standards provide basis in planning and assessment of sustainable natural resources management in achieving policy initiatives, indicators and targets. In the past, the practical use of different tools and techniques is constrained by the lack of clearly define, and valid thresholds levels of indicators for estimation and lead to extensive inconsistency in analysis. In PMPC, the minimum and maximum ranges (standards given by WHO, World Bank, IUCN, and UNEPA) are given against each indicator of social, economic and ecological perspectives which provide basis/baseline data for natural resource policy initiatives, evaluation of indicators, targets and also warn if the balance is disturbed. It will also provide information to policy makers that which indicator is near to be critical and become a threat for sustainability of the assets. These are monitored continuously according to standards and enable the decision makers to review and modify the policies according to the provided information.

5.3. Policy initiatives

The Natural Assets Management Strategy of a state should be drawn in the light of the National Development Plan (NDP) of the country. In PMPC the Policy initiatives column gives a brief account of the policy directions concerning the natural resources that does not contain statistical indicators. The first facet of the Policy Initiative column illustrates the policy reforms from the NDP about the specific natural capital. The PMPC initiatives for available asset, its utilization and as well as for risk minimization are documented. The box number two provides the policy initiatives concerning the “utilization” of the specific resource as directed by the NDP. In the case of the forestry sector specified, National directives might be to conservation and increment of the forest area and national directives for utilization could be to sustainable management of forest of the country.

The columns following are the tangible directives for PMPC, viewed under the social, economic and ecological perspectives in PMPC. These policy initiatives of sustainable management are align with the guidelines of the NDP based on Permaculture philosophy to ensure sustainability. The policy initiative column corresponding to the economically viable row contains the policy directives on utilization of forests under PMPC and in the light of NDP. Next row under the same column contains policy directives for socially acceptable for the PMPC. It is viewed in the light of directives that socially acceptable is not contradicting any directive of NDP, but it is developed to help to implement the National Development Plan. Finally, the last row contains PMPC directives for ensuring environmentally sound of the asset. General PMPC directives in this case are to improve sustainability ratio.

Integration and alignment of policies is another weak area in the planning process and it is observed that policies are failed to implement because of lack of integration. The PMPC turns out to be a problem based document, which is more concern with short term measures rather than a plan to overcome the challenges. It is quite clear that all three policy perspectives are integrated and have impact on each other. Again it is seen that the management directive in this section is not opposing each other and, helping in NDP's implementation. For instance policy initiatives to control stakeholder's conflicts (socially acceptable) such as Law and legislation, community based discussion programs, involvement of

indigenous people, institutional arrangements are also effective and increases the ecology and economic viability of the natural resources. Strategic management of natural assets is acutely related with the socio, economic and environmental perspectives of the people living in the area. Consequently involvement of the local community is vital not only for the understanding of the problems and challenges, but also for developing sustainable solution to an issue. This can be attained by establishing local agencies and educating these agencies on the problems.

The proposed PMPC is cascaded for maintaining and monitoring records at regional level. Enhanced policy monitoring and accomplishment at the local level is possible because of cascading. The regional centers are organized to develop assessment conferences, so that local information can be utilized for solving the problems. The facts and figures for policy reforms will flow upwards from the regional level where statistics is produced, to the state level, where the information will be precise for decisions making.

5.4. Critical success factors (CSF)

The column contains CSF, it focuses on reducing the risk of depletion of the asset and issues that can decrease the possibility of desired outcomes of policy initiatives; for example in social perspectives, to increase literacy rate, household income disparities, gender disparities etc. can be a CSF for the policy initiatives to increase education rate. To create livelihood options, ecotourism should be developed but this plan should be managed to consider socio, economic and ecological perspectives otherwise it will become a threat to locale friendly or prepared carefully otherwise it could harm the ecology.

5.5. Progress monitoring

A significant element of a policy document is its implementation; it is very easy for a policy to lose focus and become fails if its progress is not observed constantly. The common practice is that a recording and assessment structure is established independently for the function, but this technique has some disadvantages. Mainly policy reforms and monitoring structure is designed by diverse groups, due to it the design systems are not aligned. The PMPC offer progress monitoring indicators in the same tool for better alignment and integration. The last two columns of the PMPC propose the progress monitoring system. The columns provide qualitative and quantitative targets depend on the nature of resource being monitored and progress reports on every target aligned with the policy directives.

Development monitoring can be accomplished by utilizing the statistics existing in the columns. The column requires to be updated on given time frame cycle for accomplishment of regular evaluation. The PMPC policy directives can be reviewed in the light of the evaluation meeting to develop the policy completion procedure, or to provide new reforms to improve the implementation. The PMPC operate as a strategic management tool and provides information to decision makers on the effectiveness and progress of their policies. The proposed indicators must be measurable and quantitative, so that a comparison can be made in future for determining performance against each indicator. The key function of designed PMPC is to provide an improved and extensive monitoring and evolution of natural asset's sustainability through valuable and extensively utilized quantitative and qualitative data evaluations. That will create the required verification to determine development against the strategies and policies. The PMPC summarizes targets and as a result, indicators specify in the PMPC are synchronized and aligned with the targets of the NDP.

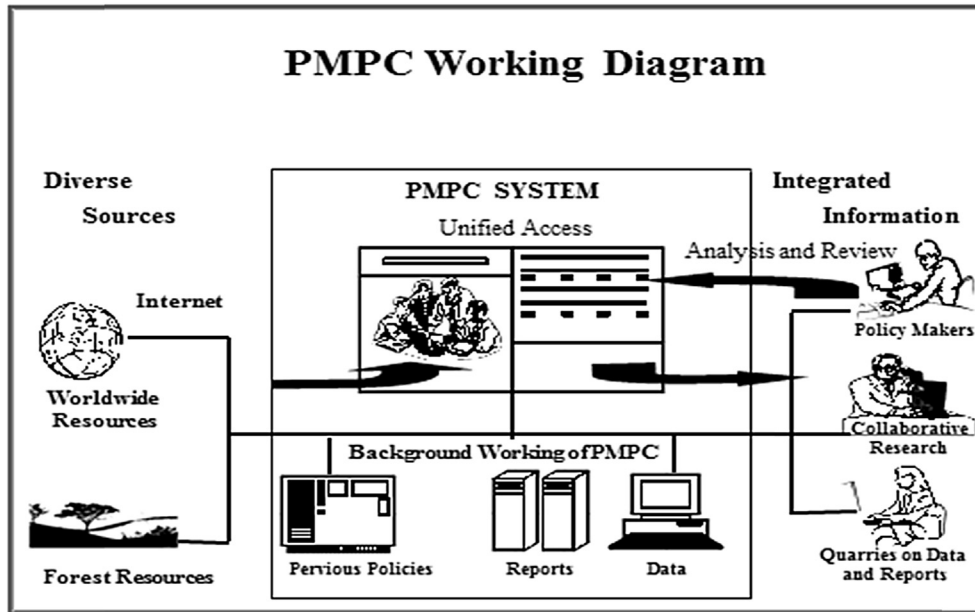


Fig. 2. Working diagram of the PMPC. Source: Compiled.

5.6. Mean of verifications

The means of verification tell us where we should obtain the data necessary to prove the objectives defined by the indicator have been reached. Most of the information is available from network reports, progress reports, survey reports and monitoring and evaluation reports. The means of verification is also presented in PMPC. In means of verification comparisons are made from the baseline (secondary data) statistics existing in the standards columns and the new obtained data through PMPC such as annual or bi-annual monitoring reports of the implementing sector. The PMPC is developed to signify increasing collective performance for the base year and targets to be accomplished. This can be followed by précis yearly performance and baseline collective performance rather than combining performance and developed targets in the evolution periods. Some of the indicators in the matrix have lack of standards (secondary data) or baseline data. The main reason attributed for non-existence of standards might be that particular indicators are recently integrated in monitoring and evaluation structure.

6. Operationalization of PMPC

The PMPC is designed through modifications in strategic management tools, which is not simply recording the tangible and intangible indicators of social, economic and ecological perspectives, but simultaneously also monitoring their consumption, standards, sustainability and CSF of the policy implementation which can turn into threats to resource depletion.

The working, process or formulation of this strategy management tool can be divided into 3 key layers as (1) data or information, (2) plan or reports based on data information and finally (3) policy initiatives for implementation as an add-on phase to achieve the decision in reality. The first layer of data base deals with social, economic and ecological indicator identification, classification and information. Reports are compiled on the basis of available or acquired research databases, scholarly articles and analyzing possible courses of action for the problem situation are dealt in report compilation phase. Third and last layer policy initiatives deal with

monitoring and evaluation, recommendation of appropriate solution. The policy makers can analyze, amend and support decision through formal analysis of provided information.

Most of the policy makers face a problem that input data are heterogeneous but PMPC provide the systematic way to integrate heterogeneous (International, National, Local and inter-sectorial) data. There are three ways by which PMPC integrate these diverse data. Firstly; local or district level data can be integrated with provincial level, Secondly provincial level data can be aligned at national level and thirdly, by converting all data on internet or GIS. The use of GIS has been highly beneficial in the integration, identification and mapping of forest globally. The integration of information is of vital importance for better planning and management for forest of all types.

- Data, information, and knowledge
- Reports on data base
- The policy initiatives

The developed strategic management tool, PMPC integrate the social, economic and ecological policies and cascaded for data monitoring at different management levels such as from top management to ground level management and from regional to local level. It delivers information to policy designers on the efficiency and evolution of their strategies. The PMPC policy initiatives can be reviewed in the light of the up dated information. The working Diagram of the PMPC tool is given in the Fig. 2.

7. Conclusion

It is an urgent priority to develop and implement new approaches that will combine economics, ecological and social factors for effective and sustainable development. The Spiral of integration of Permaculture philosophy and strategic management as an approach for sustainable development claims to answer the challenge in the domain of natural resource management.

The study develops an integrated policy management tool that can be used by policy makers for developing and monitoring progress of the policy. The tool is developed by incorporating the

theme of Permaculture that focuses on the balance between human and nature interaction. Secondly the Balance Scorecard (BSC) approach is strengthened with the monitoring capabilities of Intangible Asset Monitor (IAM) for developing a policy monitoring capabilities. Finally the Policy Matrix approach is used to align sectorial policies and reduce conflict between the policy initiatives. The operational activities of the tool (PMPC) can be divided into 3 key layers as (1) data or information, (2) research reports or plan based on data information and finally (3) policy initiatives for implementation as an add-on phase to achieve the decision in reality. The designed PMPC tool not only record the tangible and intangible indicators of social, economic and ecological perspectives, but also simultaneously monitor the consumption, standard levels, sustainability and critical success factors (CSF) of policy implementation which can turn into threats to resource depletion. The PMPC is used to translate a verbally formulated strategy into operational terms, giving it capabilities of a strategy control tool.

The key aim of incorporating strategic management and Permaculture is to provide quality of life by designing a contained the natural systems; an effort to decrease workload through planning and organizing social organizations which allocate people to work collectively. This allow people to function without an over exploitation of natural resources, with no returning to a structure of lofty workloads. Permacultural endeavour a system that promotes conniving human system base on natural ecosystems which is self-sufficient and self-regulatory. The innovative characteristic of the idea is that small is attractive and the compilations of several small activities go near altering the entire. These ideas would not be imposed from above by decision makers or legislators, but performed by individuals effective to progress their own vicinity. Self-awareness and self-sufficiency is encouraged throughout the realization of pattern in nature, not through following an organized management plan of how to survive to be sustainable in our own lives, and in our society, that required dedication and more endeavor – an innovative manner of living, resulting as of a vision of individuality in perspective within a system of interactions and of individual development in service to humanity, as our own resilience.

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