9.1 INTRODUCTION

An issue central to PES is development of markets that bring together a buyer and a seller so that they can trade environmental services like any other commodity. The essential criteria identified for efficiency of such markets are voluntariness, conditionality, differentiated payments, additionality and spatial targeting (Börner et al., 2010; Goldman-Benner et al., 2012; Wunder, 2005). Voluntariness prevents service providers from bearing the often substantial opportunity costs of conservation vis-à-vis locally more profitable land-use options; conditionality implies that non-compliance can be sanctioned by reducing or discontinuing payments; differentiated payments means payments are scaled/proportionate to services returned or actions taken; spatial targeting prioritizes the landscapes based on benefits, risk of loss and opportunity cost while, additionality mandates that payments are made for actions that would otherwise not occur.

These parameters in turn are influenced by factors such as demand and supply potential of the environmental services, value and significance of the service, geographic location of the market, commoditization potential, ease of defining and enforcing a property right, degree of excludability (extent to which the owner of the resource can exclude others from exploiting it) as also rivalry for the service provided, transaction costs, scientific uncertainty and verification possibilities, and risks (Katila and Puustjärvi, 2004). Because the constraints differ, the measures needed to promote markets for environmental services vary depending on the service.

38 Commodification of Ecosystem Services refers to the inclusion of new ecosystem functions into pricing systems and market relations (Gomez-Baggethun and Perez, 2011).
The research study through Chapter 3 to 8 has been able to build up a biophysical and economic basis of PES at local scale with respect to drinking water supplies to Greater Mumbai. This chapter explores the extent and/or the conditions under which the case study was able to meet the aforesaid criteria of efficient markets. Based on it an attempt was made to identify the policy needs and institutional arrangements that may favour introduction of PES for conservation and management of forests in the source area.

The Chapter is organized as follows: Section 9.2 describes the methodology followed by evaluation of the case study against the efficiency criteria of the markets in Section 9.3. Section 9.4 identifies the institutional arrangements that may promote efficient markets, while, Section 9.5 categories the policy interventions that may be needed to make such arrangements effective. Conclusions are drawn in section 9.6.

9.2 METHODOLOGY

Synthesis of information through review of literature including search of databases and web-sites of major organizations for case studies, analytical reviews, institutional arrangements, impact assessment, etc., was undertaken, and rationales, driving factors as also constraints in development of markets for PES were identified. A brainstorming session on ‘Managing forests and water through PES framework’ was organized on 21st May, 2012 at TERI University, Vasant Kunj, New Delhi wherein the participants from different sectors (Annexure-III) discussed the relationships between forest and water, the emerging forest management needs, the economic basis of PES and the bottlenecks in developing markets for PES. The session was accessible to professionals at TERI, Bangalore through video conferencing. Based on reviews, brainstorming session, field data and personal experiences as a forest officer-cum-administrator institutionalisation mechanisms for PES were identified. For a more focussed outcome the study was limited to efficiency and equity issues in PES were not taken into account.
9.3 EVALUATION AGAINST EFFICIENCY CRITERIA

9.3.1 Additionality

PES only makes environmental sense when it can increase service provision relative to a business-as-usual scenario, i.e., PES-induced increases in service provision vis-à-vis the baseline are “additional” (Borner et al., 2009).

Interpretation of the forest cover through the satellite images (Chapter 3, 4 and 5) indicate drastic reduction in forest cover between the years 1972-1990 and a gradual decrease since then in four watersheds – Tansa, Lower Vaitarna, Upper Vaitarna and Pise – that are supplying drinking water to Greater Mumbai. In addition conversion of old forests to open forest on fairly large scale was observed (Fig. 3.2). In comparison the forest cover in Tulsi and Vihar watersheds, which were in midst of the city, has practically remained stable.

PES was targeted only in the four watersheds that show continuous trend of FDD. Amongst them detailed analysis was carried out for the Pise watershed wherein deforestation over the horizon of 20 years from the base year (year 2010) was estimated to be 2400.67 Ha while near about an equivalent area of old forest was estimated to be converted to open and disturbed forests (Chapter 7). The PES as a conservation intervention is expected to halt the aforesaid FDD as well as unsustainable practice of shifting agriculture on steeper slopes while, under business-as-usual scenario FDD and unsustainable cultivation would have continued. Hence PES intervention can be taken as “additionality”.

9.3.2 Spatial Targeting

Spatial targeting of PES is emphasised to increase the cost effectiveness and efficiency of PES by identifying landscapes where gaps between demand and supply of the ES are high, bundling of ES is possible and risk as well as opportunity cost are low (Wendland et al., 2009).

In this instance, the watersheds supplying drinking water to Greater Mumbai lie on the Western Ghats mountain range which is an internationally recognized biodiversity hotspot. Services like carbon mitigation, bio-prospecting, soil conservation, ground water augmentation and recreation can also be added on to this bundle practically without any tradeoffs. The deforestation risks are high. The CEA of PES (Fig 7.1) indicates that even with very conservative valuation of the
services other than those for drinking water supplies (Fig. 7.2) and estimation of
the cost of conservation through WTA method (the estimated values through
which are generally higher than other valuation methods), the difference between
costs of PES and the bundled costs in business-as-usual scenario (Fig. 7.3) was
moderate. The opportunity costs and risk in investments in these watersheds are
unlikely to be the same in any similar set up across the country. From the above, it
can be interpreted that the watersheds selected for PES do meet the spatial
targeting criteria.

9.3.3 Voluntariness

An exchange between the buyer and seller is likely to be voluntary when there is
demand for the service, clarity about the returns to the investments (i.e. the
service, or at least a land-use proxy for it, is measureable, e.g., tonnes of carbon
sequestered, or the turbidity levels in water), the option is cost effective and no/low
risks are involved.

In case of Greater Mumbai, the gap between water demand and supply in the city
is increasing day by day. At the same time the treatment costs are spiralling and
costs of developing new water sources are increasingly becoming prohibitive. The
urban water utilities of the city are also at risk from climate change. So, there is
demand as well as an increased perception of threats to continued provision of ES
(i.e., scarcity of the ecosystem ES) which favours PES. This study has also been
able to characterize empirical relationship between water quality, quantity, cost of
water treatment and forest cover (Chapter 3 – 5) through which it was possible to
quantify returns to the investments. It is similarly possible to quantify carbon
sequestration and several other services of the bundle.

Chapter 7 however, brings out that the cost of PWS is substantially higher than the
deforestation induced costs borne by the Municipal Corporation of Greater
Mumbai under business-as-usual scenario (Fig. 7.3). Bundling of the ES (Fig. 7.3)
practically makes it cost effective, but at the same time it increases the complexity
of the PES projects as well as the transaction costs. Besides, the risks involved in
the investments are very high because delivery of the ES requires major changes
in behaviour of the community. Lack of secure property rights, weak national and
local institutions, undefined monitoring mechanisms, corruption and lack of
experience with such market based mechanisms add to the risks with such investments (Gunatilake and Guzman, 2008; Wendland, 2009). Hence, PES cannot be said to meet all the criteria of voluntariness.

9.3.4 Conditionality

The conditionality criterion serves to separate PES from many other incentive-based resource management approaches. In its simplest form, it means that the payment will only be made when the providers of the service implement the agreed land use changes (Wunder, 2005).

In this instance, while there is clarity about the land use/behaviour changes that need to be rewarded, well defined monitoring and enforcement mechanism are not in place. In absence of such mechanisms it may be difficult to ensure the criteria of conditionality.

9.3.5 Differentiated Payments

Differentiated payments mean payments are scaled/proportionate to services. Like conditionality, this criteria too requires strict and transparent monitoring mechanisms. In addition the differentiated scales of payment need to be defined. So, it may not be possible to ensure the criteria of differentiated payments.

9.4 INSTITUTIONAL ARRANGEMENTS TO ADDRESS THE GAPS

9.4.1 The approach

The shortfalls in meeting the efficiency criteria’s of PES (in the current setup) needs to be bridged by building of appropriate institutional framework and in-country capacity to implement these types of projects. Though the target of this section was to work out an institutional structure that complemented the Coasean market solution to the problem of externalities (see e.g., Engel et al., 2008), it was not felt feasible because of the following reasons:

39 ‘Coasean solution’ aims at correction of market failures through private transactions, often in markets where ecosystem services can be freely sold and bought. The concept is based on Coase Theorem which states that if private property rights are clearly defined by enforceable contracts, then the generator and recipient of an externality can, through voluntary exchange, potentially reach an agreement that maximizes social welfare. Furthermore, the ultimate level of the externality generating activity will not be affected by the initial assignment of property rights. Aside from the enforcement of property rights, government intervention is not required.
• Market-based services appear to have significant potential to complement services financed by the public sector. This generally means – presence of an intermediary, absence of competition and inefficiencies so often observed in Govt. programmes.

• PES projects would require a fair amount of institutional development and capacity building (Chandler, 2003, Wise and Musango, 2006) for both monitoring and delivery of the promised goods. This in turn is a time taking process. Hence, at the initial stages, the processes that need to be in place should be focussed rather than the outcomes. But markets would not be tolerant of the institutional inefficiencies and, the time and investments required for such capacity building.

• For most buyer groups of ES, payments for single services may not be cost effective i.e. it may cost much higher than the business-as-usual model.

• Cost effectiveness can be achieved only by bundling of services. This means different buyers (at local, regional and global scale) for different services which add to complexities and transaction costs.

• Best practices for PES suggest purchase of ES from the locals by single group and then unbundling and selling it to different user groups over appropriate scales – local, regional, and national (Jindal and Kerr, 2007). Such mechanism would need intermediary with substantive buying capacity. With PES markets rife with uncertainties at both local and global level it is unlikely that this agency will be a private body.

• No assurance of permanency of such payments in both local and global markets.

Against this backdrop, arranging funds through taxation and taking Govt. as buyer of the ES bundle appears to be the only feasible option for takeoff of the PES projects. The findings in Chapter 7 – the costs of PES in the four watersheds identified for PES works out to be as low as 20 INR/individual/year (0.41 USD/individual/year) and Rs 59.41 INR/household/year (1.21 USD/household/year) – combined with the increasing demand for watershed services strengthens this decision. In addition, the role of Governments may also be central in allocating property rights, coordination between stakeholders,
capacity building, strategic decisions about tradeoffs and the management of uncertainty.

Wunder et al. (2008) find government financed PES programs tend to go in way of conventional programmes. But many (Borner et al., 2010; Farley and Costanza, 2010; Goldman and Tallis, 2009, Muradian et al., 2010; Vatn, 2010) indicate the need for alternatives to strict market model of PES. Taking that main goal of PES ought to be the creation of incentives for changing individual or collective behaviour, Murudian et al. (2010) defines PES as a transfer of resources between social actors, which aims to create incentives to align individual and/or collective land use decisions with the social interest in the management of natural resources. Farley and Costanza (2010) emphasize that rather than forcing ecosystem services into the market model the economic institutions need to adapt to the physical characteristics of ecosystem services prioritizing ecological sustainability and just distribution. These approaches allows a wide diversity of possible institutional settings from schemes that could meet the conditions of market transactions (fitting into the Coasean definition) to more complex institutional arrangements for dealing with the management of common-pool natural resources, where economic transfers play a role in facilitating the coordination between participants.

Hence, PES with reconfigured roles of the public bodies and communities is in line with the aforesaid school of thoughts. Nonetheless, it is felt that the other criteria of efficiency need to be retained particularly for the services that can be commodified.

9.4.2 Key Arrangements

Transparency and accountability are felt very essential for implementation of the criteria of conditionality and differentiated payments. Hence, the roles, rights and responsibilities of institutions are defined (Table 9.1) keeping these objectives in mind. The key mechanisms proposed are:

- Funds for PES would be raised by the municipal body (Municipal Corporation of Greater Mumbai) through ‘green cess’ or ‘water charges’ and made available to the forest department for buying the bundled ES. Generation of funds by Municipal Corporation of Greater Mumbai rather
than any other body in the Government is felt important as Municipal Corporation of Greater Mumbai as service providers of ES will have stakes in the outcomes of PES project. This in turn will add an element of accountability in the system.

- To maintain the stakes of the citizens, the way in which the cess would be used would be well publicized. The practice of social audit through reputed citizens would also be followed which would be given appropriate weight in the certification process.

- Consistent with the management needs of watershed services and REDD+, the behaviour/land use that promotes the maintenance and/or the increment of mature forest cover within the watershed boundaries would be considered for payments. Minimum area, type of area as well as the groups/individuals eligible for such payments would be defined.

- Exclusiveness of rights to the land providing the services in question is one of the fundamental preconditions of PES as it excludes others from modifying service quantity and quality (Borner et al., 2010). Such rights of ownership and management of local resources as common property is vested with the local communities’ by FRA, 2006. To further facilitate the process private property options within common property settings for protection (in line with Adhikari et al., 2006) could be considered. However, sharing of usufructs would be at community level. Similarly, penalties, if any, imposed for non-performance by even one individual would be shared equally by the whole community.

- The lowest unit of PES governance should be gram sabha or its sub-entity so that issues of ownership, etc. are in line with the legal framework and Govt. policies.

- Transfer of forest management responsibilities to the communities would be preferable as it would allow the forest department to undertake its new responsibilities. However, they may still be involved in preparation and approval of the management plans (for tapping funds at local, regional and global level), overseeing its implementation, providing technical advice and coordinating with other departments.
• As indicated by Oestreicher et al. (2009), despite transfer of rights of forest management and use to the local communities, surveillance and enforcement mechanisms of the forest department will still be needed for effective protection and forest offences.

• Fair, transparent and strict monitoring is very essential for meeting the efficiency criteria of conditionality and differentiated payments. So, monitoring through three different agencies i.e. MRSAC, Nagpur (using very high resolution satellite images), ground level verification by the forest department and social audit through citizens is proposed. Final score/certification will be prepared by giving predefined weights to all the three mechanism of monitoring. Records of monitoring, certification and payment along with other pertinent information would be displayed on website as also on-site on boards for information and social audit.

• Ecosystem Service Index (in line with Jindal and Kerr, 2007) would need to be prepared for differentiated payments

• Possibility of leakages should be reduced by giving access to alternatives. Appropriate agencies and mechanisms need to be in place for it.

• Capacity building and training should be an integral part of the programme.

• The communities would be the decision makers about distribution of payments amongst its members.

9.5 POLICY DRIVERS

The legal framework was found adequate to meet the requirements of the PES projects. However, policy decisions to complement the proposed institutional structure would be required. In addition, following actions (as brought out by Farley and Costanza, 2010) would be required to strengthen and facilitate PES projects:

• Adaptive Management: Given that significant levels of uncertainty always exist in ecosystem service measurement, monitoring, valuation, and management, we should continuously gather and integrate appropriate information with the goal of learning and adaptive improvement. To do this we should evaluate the impacts of existing PES systems and design new
systems as experiments from which we can more effectively quantify performance and learn.

- **Education and Politics:** Two key limiting factors in implementing PES systems are shared knowledge of how the systems work and political will. Both of these can be overcome with targeted educational campaigns, clear dissemination of success and failures directed at both the general public and elected officials.

- **Participation:** All stakeholders (local, regional, and global) should be engaged in the formulation and implementation of PES systems. Full stakeholder awareness and participation contributes to credible, accepted rules that identify and assign the corresponding responsibilities appropriately, and that can be effectively enforced. Stakeholder participation to find protection.

- **Policy Coherence:** PES systems will be most effective when they form part of a coherent set of policies to address ecosystem use and management. They are less likely to work when other policy instruments are providing opposing incentives (for example by subsidizing the use of water, energy etc.) or when legislation controlling allocation is inflexible.

### 9.6 CONCLUSIONS

As brought out by Wendland et al. (2009), PES will not be the right approach for every situation where conservation is warranted, or where ecosystem service protection is needed. This is because high levels of congruence between conservation targets and marketable ecosystem services might not exist (Chan et al., 2006; Egoh et al., 2007; Wendland et al., 2009), and because other factors such as threats or opportunity costs might deem the PES strategy ineffective. So, selection of the PES sites must be based on the criteria of spatial targeting and additionality.

Further, government funded PES appears more feasible. While such a funding violates the important principle of voluntariness (the direct connection between the ecosystem service user and the service provider) and to some extent conditionality, it ensures longterm stable financing, provides time for capacity building and institutionalization as also facilitates PES transactions at different
scales. Besides funding, role of Govt. turns out to be central in many other aspects of PES. So, it is imperative that checks of the markets are simulated through transparent and strict monitoring and enforcement mechanisms, and indicator linked payments.

Successful implementation and sustainability of market-based mechanism such as PES heavily depends on presence of well-functioning institutions and infrastructure (Wise and Musango, 2006). Hence training and capacity building should form an important component of the strategy. Environmental Services Index (ESI) also needs to be developed for payments. The forest department needs to be prepared for new responsibilities that would arise by implementation of PES. Empowerment of local communities with rights to contract/ enter into transaction and accept payments may also be required. It should also be realized that institutionalization is a time taking process. Hence the processes that need to be in place should be focussed rather than the outcomes at the initial stages.
### Table 9.1 Proposed roles and responsibilities of various agencies for PES (source: this research)

<table>
<thead>
<tr>
<th>Role</th>
<th>Forest based Communities &amp; individuals</th>
<th>Urban body (Municipal Corporation)</th>
<th>Forest Department</th>
<th>MRSAC</th>
<th>Urban community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Role</strong></td>
<td>Seller/ provider of the ES</td>
<td>User of ES service Auditor</td>
<td>Technical Advisor to communities Buyer and Seller of ES bundle Forest police Forest certification</td>
<td>Monitoring agency</td>
<td>Social audit</td>
</tr>
<tr>
<td><strong>Rights</strong></td>
<td>Use &amp; management rights as provided under FRA, 2006 Private property options within common property settings (in line with Adhikari et al., 2006). Impose penalties for minor offences within their jurisdiction</td>
<td></td>
<td></td>
<td></td>
<td>Right to Information</td>
</tr>
<tr>
<td><strong>Responsibilities</strong></td>
<td>Behaviour change Forest management Defining roles &amp; responsibilities of participating HHs and share in the rewards</td>
<td>Funds to forest department/ communities Annual audit</td>
<td>Surveillance, control of crimes within forest Overseer implementation of forest management plans, providing technical advice and coordinating with other departments Capacity building, training Base line survey, Micro-plans + tapping local &amp; global funds Certification based on ground truth, high resolution satellite images &amp; social audit (weightage system) Developing ESI &amp; information for commodification of goods Maintenance of website which record all status of the above</td>
<td>Surveillance &amp; monitoring through high resolution satellite images</td>
<td>Social audit through randomly selected individuals</td>
</tr>
</tbody>
</table>