

Environmental Sourcebook for Micro-Finance Institutions

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(Revised)

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Sommaire

1. Le **Guide des ressources en environne-ment pour les institutions de micro-financement** (IMF) a été conçu pour aider ces institutions à améliorer la performance de leurs activités de prêts sur le plan de l'environnement. Bien qu'il soit principalement destiné aux institutions de micro-financement, ce *Guide des ressources* peut également être profitable à toute personne travaillant dans le domaine du développement des micro-entreprises. Plus particulièrement, le *Guide des ressources* aidera les institutions de micro-financement à :

- v Comprendre qu'un environnement sain est un critère de réussite des micro-entreprises.
- v Développer et mettre en oeuvre des techniques et des approches visant à améliorer la performance des projets et des programmes de micro-entreprises sur le plan de l'environnement.
- v Comprendre comment les IMF peuvent utiliser les défis environnementaux actuels pour améliorer la qualité de leurs activités et accroître leur portée.

On espère que les institutions de micro-financement utiliseront le Guide des ressources pour développer leurs techniques de gestion et de programmation sur la base des motivations liées à l'environnement.

2. La décision de l'Agence canadienne de développement international (ACDI) de promouvoir des normes environnementales plus élevées pour les micro-entreprises peut être attribuée à plusieurs facteurs. La pression interne augmente au Canada afin que toutes les initiatives de développement appuyées par le gouvernement fédéral répondent aux normes les plus élevées sur le plan environnemental. De récentes législations telles que la *Loi canadienne sur l'évaluation environnementale* (CEAA) et la *Politique environnementale de l'ACDI en matière de développement durable* ont donné, d'un point de vue politique, l'impulsion nécessaire à ce Guide des ressources.

L'inquiétude de plus en plus grande ainsi que le consensus qui existent au niveau mondial face aux menaces qui pèsent sur notre environnement, se sont traduits par des accords internationaux, des lois et règlements, qui, alliés à la nécessité de garantir un environnement sain et durable, nous obligent à faire de l'environnement un impératif à notre époque. Par ailleurs, l'ACDI, à l'instar des autres bailleurs de fonds, se doit de respecter les efforts des pays partenaires d'établir ou d'améliorer leurs propres normes environnementales.

3. D'un point de vue professionnel, il est important de donner la prééminence aux facteurs environnementaux dans toutes les formes de planification économique.
4. Il est encourageant de constater que la gestion du volet environnemental des micro-entreprises est non seulement la clé de la durabilité de l'environnement et de la santé et de la sécurité des travailleurs, mais aussi que cette gestion peut en fait *améliorer le rendement économique des micro-entreprises*, si elle est judicieusement appliquée.
5. L'ACDI reconnaît que la majorité des micro-entreprises n'ont pas d'impacts négatifs sérieux sur l'environnement. Notre souci réside dans les 10 à 25 p. 100 des projets qui exigent une

gestion environnementale. Plusieurs secteurs d'activités des micro-entreprises peuvent avoir des effets négatifs considérables sur l'environnement local. Ceux-ci comprennent les micro-entreprises qui présentent des risques graves pour la santé et la sécurité des micro-entrepreneurs, pour leurs familles et pour les collectivités locales, à moins que des mesures correctives ne soient adoptées.

6. Au niveau de la micro-entreprise, il existe un potentiel énorme de promotion des modèles d'activités économiques qui préservent l'environnement. Les institutions de micro-financement peuvent jouer un rôle majeur dans une telle promotion car elles sont souvent des institutions qui cherchent à améliorer le bien-être de la population.
7. Le Guide des ressources vise d'une manière générale à préparer les IMF à améliorer leur gestion de l'environnement. Il cherche à stimuler et à encourager la réflexion, plutôt qu'à fournir une liste de contrôle ou des questionnaires pour traiter les problèmes environnementaux auxquels se heurte chaque micro-entreprise. Le *Guide des ressources* n'est qu'un point de départ.
8. Le *Guide des ressources* propose une définition pratique d'une micro-entreprise traitant des affaires urbaines et rurales, et qui emploie moins de huit personnes, incluant l'entrepreneur. Cette définition comprend les activités agricoles à petite échelle.
9. Même si l'on ignore encore l'ampleur des effets négatifs des micro-entreprises sur l'environnement, les preuves sont suffisantes pour conclure qu'il existe des problèmes dans *certaines secteurs des micro-entreprises*. Les principaux problèmes environnementaux liés à ces micro-entreprises sont :
 - v L'impact négatif sur l'environnement de certaines micro-entreprises constitue souvent une menace directe à la vie des gens. Cela inclut principalement les mesures incorrectes de dépôt des substances et déchets dangereux, ainsi que l'utilisation sans protection préalable des produits tels que les pesticides et les produits chimiques.
 - v L'utilisation croissante des pesticides, des produits chimiques et d'autres technologies polluantes.
 - v La pollution et les déchets résultant de l'utilisation erronée des ressources et d'anciennes technologies.
 - v Un nombre de plus en plus grand de micro-entreprises qui rivalisent pour des ressources et un espace qui diminuent sans cesse.
 - v Dans les zones urbaines, l'emplacement inapproprié des micro-entreprises et leur contribution subséquente à la pression et à l'engorgement des infrastructures telles que les services de distribution d'eau et les services sanitaires.
10. À l'heure actuelle, les micro-entreprises suivantes sont les plus connues quant à leur impact sur l'environnement : l'agriculture et l'aquaculture utilisant des traitements chimiques intensifs; le travail du métal et le plaquage par galvanoplastie; le textile et l'artisanat; les ateliers de réparation d'automobiles et de moteurs; la fabrication de briques; les tanneries; l'exploitation minière à petite échelle; et les fonderies.

D'autres activités qui ont un effet marqué sur l'environnement comprennent :

- v Les ateliers de peinture et les imprimeries.
- v Les opérations de transformation d'aliments.
- v Le traitement du bois.
- v L'égrenage du coton.
- v Les enclos de bétail.
- v L'exploitation minière des récifs à corail.
- v La production de substances chimiques d'utilisation domestique pour la fabrication des pesticides.
- v Les systèmes de transport à petite échelle, comme les pousse-pousse motorisés.

L'impact direct sur l'environnement n'est pas uniquement limité aux activités de production. Les secteurs non-manufacturiers, tels que les petits commerces et restaurants installés le long des rues, peuvent provoquer des problèmes environne-mentaux par l'utilisation inadéquate de certaines ressources naturelles comme le bois de chauffage.

11. Au fur et à mesure que le nombre de micro-entreprises augmente, les micro-entrepreneurs sont de plus en plus engagés dans un champ plus large d'activités économiques, ce qui accroît la possibilité de nouvelles pratiques nuisibles. On peut s'attendre à ce que l'impact environnemental des micro-entreprises devienne, avec le temps, de plus en plus diversifié et diffus.
12. L'explosion des micro-entreprises dans les zones urbaines a été phénoménale. Elle s'est faite dans un contexte de congestion de plus en plus grande, sur la base d'une population qui augmente rapidement, d'une crise du logement, et d'une réduction des services essentiels tels que le transport, les services de santé et le système sanitaire. Les micro-entreprises ne sont pas la cause de ces problèmes mais elles peuvent certainement contribuer à aggraver la situation. Elles utilisent en général des technologies vétustes et manquent de connaissances et de moyens qui leur permettraient d'investir dans de nouvelles technologies plus « propres ». À cause du milieu dans lequel elles opèrent et des installations qu'elles possèdent, les micro-entreprises ne peuvent que trop rarement contrôler de façon adéquate l'impact de leurs activités sur l'environnement.
13. En plus de l'utilisation excessive des pesticides et des produits chimiques dans les exploitations agricoles à petite échelle, il existe d'autres sujets de préoccupations d'ordre environnemental en milieu rural. Dans l'ensemble, le défi est similaire à celui des régions urbaines en ce sens que la terre et les ressources sont en train de disparaître. Les fermiers exploitant les terres à petite échelle contribuent à ce problème en utilisant des pratiques agricoles qui dégradent leurs ressources. Les pratiques d'aquaculture à petite échelle en Asie et en Afrique sont également en cause, non seulement en raison de l'utilisation excessive de produits chimiques mais aussi à cause des risques encourus par la faune, et l'utilisation inappropriée de la terre.

Les impacts environnementaux des activités des micro-entreprises, aussi bien rurales qu'urbaines, sont reliés à un ensemble de facteurs légaux, politiques, sociaux et économiques sur lesquels les micro-entrepreneurs ont peu de contrôle. On souligne de plus en plus la nécessité de travailler avec les gouvernements aux niveaux national et local pour changer les lois dans le but d'améliorer les normes environnementales.

14. Généralement, la majorité des micro-entreprises souscrivent aux pratiques qui préservent l'environnement. En fait, certaines activités de ces micro-entreprises *ont des effets bénéfiques* sur l'environnement. L'exemple le mieux documenté est le travail de recyclage dans le secteur informel.
15. Entre-temps, certains signes indiquent qu'il est possible d'améliorer la performance environnementale de plusieurs micro-entreprises ayant des problèmes reliés à l'environnement. Dans le but de venir en aide aux micro-entrepreneurs, les IMF doivent commencer à mettre sur pied leur *capacité environnementale*.
16. Le processus d'évaluation de la capacité environnementale peut d'abord poser les questions de base concernant les ressources et les besoins dans le domaine environnemental. Une bonne partie des compétences et des connaissances acquises dans d'autres aspects du travail des IMF peuvent s'appliquer à la gestion environnementale.
17. Chaque IMF doit décider comment renforcer sa propre capacité environnementale, et prendre les mesures internes nécessaires pour garantir que des mécanismes d'appui sont en place. Le *Guide des ressources* souligne l'importance pour les IMF de collaborer avec d'autres groupes. Toutefois, cette collaboration ne devrait pas porter atteinte à la création d'une capacité environnementale interne.
18. Les IMF devraient développer plus particulièrement leur capacité d'entreprendre des évaluations environnementales. L'Évaluation environnementale (EE), également appelée Évaluation de l'impact environnemental (EIE), consiste à *évaluer et anticiper l'impact environnemental du projet, à identifier les mesures d'atténuation et, si besoin est, à trouver les alternatives*. L'EE est utilisée depuis l'étape de la conception du projet jusqu'à son exécution comme un moyen de contrôle contre toutes conséquences nuisibles.
19. Chaque écosystème a un seuil critique de dégradation, c'est-à-dire une capacité limite d'assimilation ainsi qu'une certaine capacité d'autoépuration. Ces limites sont définies comme suit par la Banque mondiale :
 - v Les émissions de déchets d'un projet ne devraient pas dépasser la capacité de l'environnement local d'absorber ces déchets sans dégradation sérieuse de sa capacité d'assimilation future ou d'autres importants services.
 - v Les taux d'exploitation des ressources renouvelables ne devraient pas dépasser la capacité d'autoépuration du système naturel qui les génère; les taux de dégradation des ressources non renouvelables devraient correspondre au taux auquel les sources renouvelables de remplacement sont mises au point grâce aux découvertes et à l'investissement.

20. L'importance de collecter et de gérer l'information ne devrait pas être sous-estimée. Si elle est gérée correctement, l'information peut considérablement augmenter la capacité de gestion environne-mentale.
21. Il est certain que beaucoup peut être accompli si l'on travaille de manière indépendante, mais on y gagne plus encore à travailler avec d'autres groupes. Le partenariat offre la possibilité d'utiliser les connaissances et l'expertise dans d'autres domaines pour s'attaquer aux problèmes environ-nementaux.
22. Le fait de travailler avec les micro-entrepreneurs et avec les collectivités permettra aux IMF de faire la différence entre les pratiques de protection de l'environnement qui sont essentielles à l'environne-ment et au bien-être de la collectivité, et les pratiques qui interfèrent inutilement dans les opérations des micro-entreprises.
23. Les micro-entrepreneurs peuvent être peu disposés à participer aux activités visant à améliorer la gestion environnementale de leurs entreprises. Le défi pour les IMF consiste à cerner et à utiliser des moyens susceptibles de favoriser l'engagement des micro-entrepreneurs. Ces derniers ne seront probablement pas intéressés si leur engagement n'est pas profitable financièrement, ou s'il n'est profitable qu'à long terme. Heureusement, il est possible d'atteindre en même temps les objectifs professionnels et environnementaux.
24. La formation peut permettre de développer les compétences et les connaissances du personnel, des groupes partenaires et des micro-entrepreneurs en matière d'environnement.
25. La promotion du changement technologique dans les activités de production des micro-entreprises est le moyen le plus direct d'éliminer les problèmes environnementaux.
26. La force des IMF dans la promotion du changement environnemental réside dans leur capacité d'atteindre et d'influencer un grand nombre de micro-entrepreneurs.
27. Les IMF devraient considérer la création d'un espace public qui pourrait servir de centre pour favoriser le maillage, l'échange d'idées, et la promotion de l'innovation, de la recherche et du développement.
28. La collaboration avec des moyennes ou grandes compagnies afin de mettre au point et de promouvoir des technologies sans danger pour l'environnement, et des produits pouvant être utilisés dans le secteur de la micro-entreprise, peut ouvrir la porte à de nouvelles possibilités. Les compagnies de moyenne et de grande envergure peuvent contribuer par leurs connaissances et leur technologies à diverses étapes de la production des micro-entreprises, ou peuvent fabriquer des produits complémentaires.
29. Les principes de rentabilité et d'autosuffisance financière devraient, au plus haut degré possible, gouverner les approches visant à couvrir le coût de la formation ou à faciliter l'achat de technologies sans danger pour l'environnement.³⁰
30. La recherche limitée sur les micro-entreprises et les petites entreprises indique que l'environnement, la santé du travailleur, la sécurité et la rentabilité sont souvent compromis par de pauvres standards environnementaux de santé et de sécurité en milieu de travail.
31. Les principaux problèmes de santé et de sécurité reliés à l'environnement sont :

- v La menace constante que représente pour les travailleurs la présence de substances dangereuses.
 - v Les conditions de travail dangereuses et les pratiques insécurisantes de travail.
 - v L'utilisation inadéquate ou l'absence d'équipe-ment de protection.
 - v L'emplacement inapproprié du lieu de travail.
 - v Le manque d'installation de soins de santé comme les cliniques de premiers secours, et les services sanitaires adéquats.
 - v Le manque d'information.
 - v La faible priorité accordée à ces problèmes par les entrepreneurs et les travailleurs.
 - v Une productivité en baisse due à la maladie et aux blessures.
- 32.** On reconnaît généralement que les produits chimiques jouent un rôle important dans plusieurs domaines de l'activité économique, tant en milieu rural qu'urbain. Toutefois, l'utilisation de ces produits chimiques et des pesticides présentent certains risques et créent des responsabilités qui ne sont pas toujours entièrement comprises. Ce ne sont pas nécessairement les produits chimiques en tant que tels qui posent problème, mais plutôt la manière dont ils sont maniés, transportés, stockés et utilisés. Chaque année, il y a des *centaines de milliers* de mésaventures se rapportant aux produits chimiques dans les lieux de travail, et qui se terminent par des blessures ou par des décès.
- 33.** Jusqu'au moment où les substances dangereuses ont fait leur entrée dans le monde du secteur informel, il a probablement existé des systèmes de contrôle pouvant raisonnablement assurer leur utilisation de façon sécuritaire. Toutefois, la réglementation qui s'y rapporte et sa mise en application n'existent pas dans le secteur informel.
- 34.** Même en l'absence de statistiques fiables, on reconnaît généralement que le taux d'incidence de l'empoisonnement par les produits chimiques est le plus élevé dans l'agriculture. Ce qui veut dire que l'entrepreneur rural travaille dans le contexte le plus dangereux.
- 35.** Il est clair qu'il y a un manque significatif de leadership dans la promotion d'un environnement sain de travail. Les travailleurs et les entrepreneurs se sont vu refuser les droits fondamentaux qui leur sont garantis en vertu des conventions inter-nationales comme la Convention de 1990 sur les produits chimiques (no. 170) et la Convention de 1993 sur les accidents industriels (No. 174).
- 36.** La planification environnementale en matière de santé et de sécurité pour les micro-entreprises sera plus facile à entreprendre dans *un cadre de planification*. Dans l'ensemble, un tel cadre devrait mettre l'accent sur de simples interventions visant à prévenir les accidents et autres mésaventures, plutôt qu'à contrôler.
- 37.** Les IMF peuvent profiter d'un intérêt mondial pour la santé et la sécurité en milieu de travail, ainsi que de la recherche sur les produits chimiques. Elles peuvent aussi avoir accès à une information abondante et à plusieurs sources d'information institutionnelles.

38. Étant donné qu'il existe une grande variété de micro-entreprises, il est impossible de tracer des lignes directrices en matière d'environnement pour chacune d'entre elles. Le chapitre 5 présente des lignes directrices pour la transformation des aliments, pour l'aquaculture, le traitement de la volaille et du bétail, les micro-entreprises installées en zone urbaine, et des directives environne-mentales de santé et de sécurité applicables à de nombreux types de micro-entreprises.
39. Dans plusieurs cas, il sera nécessaire et plus constructif pour les IMF d'élaborer leurs propres lignes directrices environnementales. Celles-ci refléteront mieux les conditions locales et le type de micro-entreprises.
40. Les problèmes environnementaux peuvent devenir des occasions de diversifier la base économique du secteur des micro-entreprises. La transformation nécessaire de l'environnement urbain et rural peut être accélérée grâce aux activités des petites entreprises plus centrées sur l'environnement.
41. Pendant des années, les activités économiques basées sur l'environnement ont été l'une des rares réalisations positives des économies stagnantes du monde industriel. L'industrie canadienne de l'environnement, par exemple, s'est développée à un rythme de 10 p. 100 par année, devançant largement les autres secteurs de l'économie.
42. Le développement de marchés « plus verts » des micro-entreprises dans le monde en développement aura certaines caractéristiques des industries occidentales de l'environnement. Ceci inclut le développement de nouveaux marchés et de technologies, la prestation de biens et de services environnementaux, la promotion du raffinement des processus et des techniques de production existants, et le développement ainsi que l'utilisation des sources d'énergie nouvelles et plus efficaces.

Chapter One Introduction

1.0 Purpose of this Sourcebook

The Environmental Sourcebook for Micro-Finance Institutions (MFIs) is designed to help MFIs improve the environmental performance of their lending activities. While MFIs are the target audience, it is hoped the Sourcebook is of use to anyone involved in micro-enterprise development. Specifically, the *Sourcebook* will help MFIs to:

- v Understand the importance of environmental well-being to the success of micro-enterprises.
- v Develop and implement techniques and approaches for improving the environmental performance of micro-enterprise projects and programmes.
- v Understand how MFIs can turn current environmental challenges into opportunities to improve the quality and expand the range of MFI activities.

It is hoped the *Sourcebook* will serve as a *resource tool* for MFIs to develop management techniques and programming options based on environmental motivations. We do not expect every suggestion in this *Sourcebook* will be acted upon. Instead, the Sourcebook describes a flexible, multifaceted application of environmental management tools and techniques that anticipates different levels of commitment and allows each MFI to determine its own approach.

Every effort has been made to ensure the *Sourcebook's* recommendations work within the financial constraints of MFIs. We have also tried to encourage environmental solutions that build on the strengths and character of MFIs without unnecessarily burdening MFIs with environmental regulations or practices that, in the end, interfere with the ability to deliver micro-finance programmes.

1.1 Rationale for the Sourcebook

The motivation for promoting higher environmental standards for micro-enterprises can be attributed to a number of factors. In Canada, there is growing domestic pressure to ensure that all development initiatives receiving support from the federal government adhere to the highest environmental standards possible. New environmental legislation such as the Canadian Environmental Assessment Act (CEAA) and CIDA's own *Policy for Environmental Sustainability* are the impetus for this Sourcebook from a policy standpoint.

Growing international concern and consensus about threats to our environment, manifested in environmental agreements, laws and standards, together with the need to ensure a sustainable, healthy environment, make a stronger concern for the environment imperative. Also, CIDA, like all donors, must respect the efforts of partner countries to establish and/or improve their own environmental standards.

From a professional's standpoint, it is important that environmental considerations be preeminent in all forms of economic planning. Most measures that stimulate job creation and economic

growth also have direct environmental consequences. On the other hand, environmental degradation can restrict economic opportunities at the micro level.

The good news is that environmental management of micro-enterprise is not only key to environmental sustainability and worker health and safety but, judiciously applied, can actually improve *micro-enterprise economic performance*. That is, increasingly it is recognised that incorporating environmental concerns into the heart of enterprise decision-making can result in significant economic and social dividends. Hence, as CIDA and other donors increase their support for micro-enterprise activity, it is important that these efforts are not compromised by environmental neglect.

It is recognised most micro-enterprises do not have serious negative impacts on the environment. The concern is with the 10 to 25 per cent of projects that do require some form of environmental management. Several sectors of micro-enterprise activity can have substantial negative effects on the local environment. These include micro-enterprises which, unless certain measures are taken, carry significant health and safety risks for micro-entrepreneurs, their families and local communities. Also, the potential cumulative impact of millions of mostly unregulated micro-enterprises is, without question, substantial. As the number of micro-enterprises grows, their impact on the environment will increase. Seen another way, the potential cumulative economic benefits from careful environmental management of millions of micro-enterprises is also substantial. There is enormous potential at the micro-enterprise level to promote environmentally-sustainable patterns of economic activity. MFIs could play an important role in such promotion as they are often the key institutions serving to improve the economic well-being of a population. With proper planning, micro-financing could become a major component of efforts to promote sustainable development.

1.2 A Cautionary Note

The relationship between the environment and micro-entrepreneurial activity is highly complex. Micro-financing is used to support a diverse range of micro-scale enterprises with an equally diverse range of potential impacts on the environment. It would be wrong to suggest that any document could provide solutions to every environmental problem. For this reason, this *Sourcebook* has been designed to prepare MFIs in a general manner for improving environmental management. It is meant to encourage thought and reflection rather than providing a set of checklists or questionnaires for dealing with the environmental problems of every micro-enterprise. The *Sourcebook* is simply a starting point.

1.3 Working Definitions

Micro-Enterprise

Although it is important to distinguish between “micro-enterprises” and “small-scale enterprises”, for the purpose of this *Sourcebook* a certain degree of flexibility is required in defining a micro-enterprise. We suggest a working definition of micro-enterprise encompassing both urban and rural businesses employing less than eight people including the entrepreneur.

A more open definition provides greater flexibility in understanding both problems and solutions. Our definition includes small-scale agriculture activity. Although the term *micro-enterprise* rarely refers to small-scale agricultural activities, it is advantageous to examine small-scale agricultural enterprise in the same context as other micro-economic activity.

Environmental Problem

The *Sourcebook* uses broad terms to define an environmental problem, including problems related to pollution, waste management, land and resource depletion and workplace and community health and safety issues.

1.4 The Sourcebook's Content

In addition to this introduction, the *Sourcebook* is comprised of four chapters and two appendices. These are:

Chapter 2: Environmental Problématique of Micro-Enterprises

This opening chapter attempts to understand the extent of the environmental problems associated with micro-enterprises. The French term “problématique,” which refers to a series of interrelated problems which reinforce each other, is an appropriate term for the situation.

The chapter examines the conditions which contribute to the negative environmental impact of micro-enterprises. It also looks at underlying systemic factors that constrain micro-enterprises from adopting good environmental practices. Finally, the chapter recognises the contribution many micro-enterprises are making to sustainable development through such practices as recycling and minimising waste.

Chapter Three: Building The Environmental Capacity Of MFIs

This chapter provides direction on how MFIs can:

- ▼ Develop environmental knowledge, judgement and management capacity.
- ▼ Better analyse the environmental impact of micro-enterprises including how to undertake an environmental assessment.
- ▼ Use participatory techniques to involve micro-entrepreneurs and local communities in finding solutions to environmental problems.
- ▼ Develop partnerships with other development groups to achieve environmental ends.
- ▼ Promote improved environmental standards through technological change, the encouragement of networking amongst micro-entrepreneurs, collaboration with larger companies to introduce more environmentally efficient technologies and products, and the use of regulation.

Chapter Four: Environmental Health and Safety Practices for Micro-enterprises

Special attention must be given to workplace environmental health and safety issues. This chapter examines the magnitude of the problem and provides insight on how to improve the health and safety practices of micro-entrepreneurs.

Chapter Five: Environmental Guidelines for Micro-Enterprises

This chapter provides examples of environmental guidelines for different types of micro-enterprise activity. This includes environmental guidelines for use at the programming level. As well, the chapter discusses how MFIs can develop and utilise their own environmental guidelines.

Appendix 1

As important as it is to minimise environmental damage, it is perhaps equally as advantageous to explore business opportunities related to environmental protection. The environmental imperative to make more efficient use of space, resources and infrastructure creates business opportunities for micro-entrepreneurs. In this section, the fields of agriculture, recycling, transportation, energy, housing, water and sanitation, and health are examined from an environmental perspective to assess their business potential for micro-entrepreneurs.

Appendix 2

Appendix 2 presents three case studies of environmentally-based micro-enterprises.

Chapter Two Environmental Problématique of Micro-Enterprises

2.0 Key Environmental Impacts

While the evidence seems to suggest that small-scale economic activity can be more harmful on a per unit of output basis than larger enterprises (Kent 1991), there is a lack of quantitative data on the environmental impact of micro-enterprises. Although the extent of micro-enterprise negative impact on the environment remains unknown, there is sufficient evidence to conclude there are problems in *certain micro-enterprise sectors*. The key environmental problems associated primarily with these micro-enterprises are:

- ▼ The negative environmental impacts of micro-enterprises often pose a direct threat to human life. This includes, above all, the improper disposal and unsafe use of hazardous substances such as pesticides and chemicals.
- ▼ The growing use of pesticides, chemicals and other polluting technologies.
- ▼ Pollution and waste through the inefficient use of resources and outdated technologies.
- ▼ An ever-increasing number of micro-enterprises competing for diminishing resources and space.
- ▼ In urban areas, the inappropriate location of micro-enterprises and their subsequent contribution to overcrowding and pressure on infrastructure such as water and sanitation services.

2.1 Problem Sectors

A variety of micro-enterprises have the potential to harm the environment. Some pose a more serious threat than others. Currently, the following micro-enterprises are considered most notorious in terms of their environmental impact. Of course, the environmental threat of these activities will vary from location to location and from situation to situation:

1. *Chemical-Intensive Agriculture and Aquaculture Activity*

The unsafe use of chemicals in agriculture and aquaculture is rampant in developing countries. Small-scale farmers are using pesticides, fertilisers and other chemicals with little understanding of the associated environmental and health risks.

2. *Metalworking and Electroplating Industry*

As Biller (1995, 5) points out, “many enterprises in this sector operate in backyards or homes. The major contamination from this [activity] occurs in the form of hazardous wastes like heavy metals, for which the absorptive capacity of the receiving environment is very low. High content heavy metals can render a sewerage ineffective by negating the biological process that sewage systems employ to treat waste.”

3. *Textile and Crafts Industry*

As the use of toxic products in the production of crafts grows, the associated environmental and human health risks increase (Bengtsson 1995). Potentially dangerous crafts include those using wood, ceramics and clay.

In another sector, “minor contamination may be caused by solid wastes” from the manufacture of textiles including the production of cotton fabrics, garments and batiks. Major contamination may occur when large quantities of particulates such as alkaline liquid are discharged into local water sources. Air pollution in this sector can also be a significant problem in local neighbourhoods (Biller 1995, 5).

4. *Automobile and Motor Repair Shops*

Automobile and motor repair shops “contribute to inappropriate toxic waste disposal through used oils and batteries and other contaminants such as sludge from car and engine washing. These contaminants find their way directly into the environment or sewerage systems” (Biller 1995, 5).

5. *Brick Manufacturing*

Brick manufacturing can be a major source of air and water pollution in some cities, typically from emission of particulates and release of sediments into waterways. The extent of these impacts is largely a function of the population density in the manufacturing area and the other uses of the waterways being contaminated (Biller 1995, 6).

In some rural locations, the mining of clay for brick production can involve the destruction of sensitive lands (Pallen 1997).

6. *Tanneries*

Tanning is the most researched small-scale economic activity in terms of its environmental impact. This sector is very large and active in most developing countries. Its major effluents make up a cocktail of hazardous wastes such as heavy metals, organic compounds and liquid detergents. These substances are discharged into sewage systems and rivers. In addition, tanning contributes significantly to air pollution.

7. *Small-scale Mining*

The following statement, made by a small-scale miner in Brazil, perfectly summarises the environmental impact of this activity: “Wherever we go, a track of destruction is left behind. Mercury stays in the rivers, and soil is degraded. We corrupt the culture, the location, and the conduct of the areas where we arrive. We destroy everything” (Biller 1994, 5-6).

8. *Foundries*

Often operating out of homes and backyards, foundries are a source of air pollution from gases, metal fumes, organic solvents and dusts. The human health risks are substantial (see Chapter_4).

Other activities that have a pronounced environmental impact include:

- ▼ Paint and printing shops, which use a variety of toxic substances (Bartone 1995).
- ▼ Food processing operations (grain, sugar milling, edible oils, etc.) that produce potentially dangerous wastewater and organic wastes (Bengtsson 1995, 2).
- ▼ Wood processing (furniture, construction material), which uses toxic materials such as glues and paints (Bengtsson 1995, 2).
- ▼ Cotton ginning, which releases large quantities of cotton seeds and dust into the air (ILO 1992, 21).
- ▼ “Livestock pens used for slaughtering, trimming, vaccination and disinfection of animals can lead to the release of large quantities of various bio-chemical polluting effluents. Human beings might also be exposed to animal related diseases such as brucellosis, skin diseases or anthrax” (ILO 1992, 21).
- ▼ In coastal areas of countries such as Sri Lanka, the mining of coral reefs for use in micro-enterprise lime production is having a disastrous effect on coastal ecosystems (Pallen 1997).
- ▼ Micro-enterprises producing chemicals for domestic use in soaps, detergents and other cleaning agents, and in the manufacture of pesticides (Stratz 1996; Bartone 1995).
- ▼ Small-scale transportation systems, such as motorised rickshaws used for economic purposes, are major air polluters in Asia.

Direct environmental impacts are not limited to manufacturing activities. Non-manufacturing sectors, such as roadstand shops and restaurants, can contribute to environmental problems through the inefficient use of natural resources such as firewood. Other activities such as the operation of kilns for beer production are often extremely natural resource-intensive. In Asian cities, for example, small-scale enterprises alone consume a significant minority of all fuelwood used (Kent 1991).

As the number of micro-enterprises continues to grow, micro-entrepreneurs are becoming involved in a wider variety of economic activities. This raises the possibility of potential new harmful practices. It can be expected that the environmental impact of micro-enterprises will, over time, become more varied and diffuse.

2.2 Environmental Problems in Urban and Non-Urban Areas

A. Urban Areas

The explosion of micro-enterprises in urban areas has been phenomenal. It has occurred in a context of growing congestion, a rapidly increasing population base, a crisis in housing, and a reduction in basic services such as transportation, health and sanitation. Micro-enterprises do not cause these problems but they certainly complicate matters. They typically use outdated technologies and lack knowledge about, and are unable to invest in, new, cleaner technologies (Bengtsson 1995,25). Too rarely do micro-enterprises operate in locations and facilities where the environmental impacts can be properly managed. Urban micro-entrepreneurs operating in the informal sector rarely have access to infrastructure such as transportation, a sewage system or waste collection. The most glaring problems relate to the absence of sanitation and water services. As Stratz (1995, 12) describes:

Where toilet facilities are inadequate or where informal enterprises produce industrial effluent that is not channelled into municipal wastewater pipes there is a good chance that small brooks and rivers are polluted with raw effluent that will finally end up in dams that are used for drinking water supplies and irrigation purposes. In some cases there are also riverbanks that develop into dumping areas for a variety of waste materials that can be partially traced back to informal enterprises.

Micro-enterprises locate where there are business opportunities. This is often in overcrowded areas and along streets. This situation leads to accidents and other problems with pedestrians. Stratz (1995,12) describes the situation in Masvingo, Zimbabwe as follows:

There is also the problem of the growing number of people that join the informal sector. Light industrial stands allocated to the informal sector become overcrowded, areas around bus-stops and roadside stalls occupied by informal enterprises are expanding in all directions thus becoming unmanageable in terms of basic requirements for environmentally safe business operations. Toilet facilities are often non existent leading to congested public toilet and overcrowded facilities at nearby beerhalls. The state of waste management is characterised by overflowing dustbins and illegal waste dumpings roads and underdeveloped stands.... Depending on the type of waste being dumped, there is an immediate danger from hazardous substances like acids, contaminated solvents and used oil and lubricants.

The sort of situation described by Stratz make informal sector entrepreneurs vulnerable to the whims of police, city planners, and inspectors who use the apparent disorder as a pretext to penalise informal entrepreneurs. In some cases, entire areas of informal activity are destroyed and informal workers displaced (Omuta 1986).

Box 2.1 provides a comprehensive view of the sorts of environmental problems associated with informal activity in urban areas such as Masvingo, Zimbabwe. The ILO and the Informal Sector Training and Resources Network (ISTARN) undertook a study of the situation as a preliminary step in the development of a worker safety module for informal workers in Masvingo.

B. Non-Urban Areas

In addition to excessive pesticide and chemical use by small-scale farmers, there is a host of other environmental concerns found in rural areas. The overall environmental challenge is similar to urban areas in that land and resources are disappearing. Small-scale farmers can contribute to this problem by employing resource degrading agriculture practices such as expanding agricultural production in forests and marginal lands. In some areas, inappropriate livestock management practices are contributing to overgrazing and deforestation (Knausenberger 1996). Small-scale aquaculture practices in Asia and Africa are coming under

Box 2.1 View from Masvingo

Air Pollution

Enterprises in the woodworking and metalworking sector contribute to air pollution through emission of dust which is mostly produced in the finishing stage (glass-papering) of the production process. There is also the emission of solvent fumes or paint/lacquer/solvent mixtures whenever a product is spray painted or otherwise finished in the open. Some informal enterprises may use volatile cleanser or contribute to air pollution through burning their waste, test running engines or allowing industrial gases (like ammonia used in refrigerators) to escape into the surrounding air.

Noise

Informal enterprises that operate from open sheds may already cause a high noise level with day-to-day work like hammering. Wherever the use of industrial machines is involved, noise levels usually become so high that even brick walls will not effectively solve the problem. Another area of concern is the test running of combustion engines and the testing of exhaust systems. These activities can lead to loss of hearing.

Soil and Groundwater Pollution

Informal enterprises do not know what to do with their liquid waste materials like lubricants and cleaners. Municipalities provide services for only the most un-problematic forms of waste. Therefore, enterprises of all sizes must dispose of liquid waste by pouring it into the ground and contaminating soil and groundwater reserves, making dumping areas unsuitable for plant growth and groundwater unfit for human consumption.

Woodworking may contribute to the problem by dumping small quantities of thinners, turpentine or paraffin laced with other substances from cleaning paint brushes and other painting equipment. There is also a good chance that tins with dried-up paint or lacquer will be thrown into waste-pits.

In the metalworking sector the problems are similar but one can add lubricants, fluxes and specialised liquids like brake fluid, metal additives and radiator additives to the list of dangerous substances that may be dumped directly into the ground. Informal chemical enterprises may do the same with byproducts and waste like brine, glycerol, alkalines (from soapmaking), acids or other corrosive or oxidising liquids.

Source: Stratz 1995.

increasing scrutiny not only because of the excessive use of chemicals but other environmental risks to wildlife and the inappropriate use of good farmland as well.

The impact of non-farm enterprises is often insignificant. In fact, the creation of non-farm enterprises in rural areas is considered by many (see Kent 1991) as a key micro-enterprise contribution to sustainable development through provision of an alternative to farming in marginal areas. However, not all non-farm enterprises are so environmentally-benign. In fact, it has been proven that small-scale enterprises such as tanneries and textile dyeing operations can have livestock management practices are contributing to overgrazing and deforestation (Knausenberger 1996). Small-scale aquaculture practices in Asia and Africa are coming under increasing scrutiny not only because of the excessive use of chemicals but other environmental risks to wildlife and the inappropriate use of good farmland as well.

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2.3 The Roots of the Problems

The environmental impacts of micro-entrepreneurial activity, both urban and rural, are related to an array of legal, political, economic and social factors that micro-entrepreneurs have little control over. In urban areas, at the core of the informal sector's environmental problem is the lack of viable work premises and supporting infrastructural facilities. Perra (1996, 3) points out “the uncertainty of tenure is the real explanation of why the majority of informal sector activities operate in ramshackle sheds which are sometimes hazardous and constitute visual intrusions. A lack of tenure also generates a feeling of indifference to the improvement and maintenance of the physical environment.” Furthermore:

Often the environmental conflicts, hazards and pollution effects associated with the informal sector are largely a manifestation of unresponsive physical planning systems rather than inherent attributes of the sector itself. Accommodating the informal sector is seen as a physical planning approach for urban environmental management. Accommodation is defined and seen here in terms of the physical attributes of location, space, shelter and services together with security of tenure” (Perra 1996, 5).

Madely (1994, 1-4) sees the problem from a legal perspective:

The towns and cities and countryside of the developing world are often burdened with laws which are inappropriate for many of their inhabitants, especially for the poor. In the areas of housing, water, sanitation and transport, but also for food output, laws represent a problem which makes life harder for the urban poor. Land tenure, building and housing codes, overlapping government and departmental authority leaves people in vulnerable and often unsafe situations.

As the attention of this *Sourcebook* turns to solutions, the need to work with national and local governments to change laws to improve the standards of the working environment will be

Box 2.2 Differing Perceptions

In an ILO/ISTARN project to bring the two major stakeholders in the field of environmentally-friendly workspaces together, the first step was to hold trust-building workshops between MISA (Masvingo informal sector association) and the Municipality of Masvingo. Although progress was made in bringing the groups together, initial differences regarding the major environmental concerns and their causes were significant:

The Major Problems Identified by MISA

- P** Insufficient financial resources available to informal enterprises to invest in cleaner and healthier production procedures.
- P** Inadequate tools and equipment due to a lack of service.
- P** Low levels of education and awareness about environmental dangers amongst a number of people working in the informal sector.
- P** Insufficient workspace due to congested stands because of insufficient number of stands available to informal sector.
- P** Widespread profiteering attitude among informal entrepreneurs which leads to “savings” on protective clothing, etc.

Major Problems from the Perspective of Municipal Authorities:

- P** Illegal dumping of waste and littering.
- P** Licensing informal sector activities.
- P** Destruction of trees and lawns.
- P** Pollution.
- P** Illegal sale of food under unhygienic conditions.

Source: Peters-Berries 1996.

continually emphasized. An amendment to a simple building or housing code could greatly serve both environmental and economic purposes. This will not be easy. As Box 2.2 demonstrates, there are often significant differences in the opinions of authorities and informal entrepreneurs as to what causes the environmental problems of the informal sector.

Micro-entrepreneurs are also involved in the repair and maintenance of a wide range of goods such as automobiles and motors, ensuring their long-term use. The sale and construction of energy efficient woodstoves (Kent 1991) and the endless number of livelihoods gained in developing countries through the sustainable use of non-timber forest products (FAO 1991a; 1991b) are other good examples of environmentally beneficial micro-enterprises.

Box 2.3

Cairo Zabbaleen

In Cairo, Zabbaleen is an Arabic term used to describe garbage collectors living in settlements like Moqattam. They collect half of the 6,000 tonnes of garbage that Cairo generates daily and transport it to their settlement where it is sorted and recycled, or used for animal fodder. The Zabbaleen have demonstrated an impressive innovative streak in recycling. Hangers are made from recycled plastic pellets. Waste cotton is turned into colourful rugs and mattresses. The Zabbaleen have managed to develop their community through recycling activities. In 1988, the Association for the Protection of the Environment was formed to train Zabbaleen girls to make quilts and rugs. One hundred girls are selected from (Cairo's) poorest families each year to participate in the project. In one low income neighbourhood a successful fee collection service was put in place.

The Small Industries Project, funded by Oxfam, offered credit and technical expertise to small community-based recycling industries in order to maximise the resource value of waste. This project allowed some families to buy plastic granulating machines to recycle plastic, and rag pulling machines to recycle rags.

In addition, the Association of Garbage Collectors for Community Development has been behind a number of broader community development initiatives. The non-profit association has provided health care, learning facilities, animal clinics, and credit learning facilities that have facilitated the purchase of equipment such as plastic crushers. Sixty-four per cent of the Zabbaleen women involved in quilt-making have been introduced to family planning through the association.

Source: Mega-Cities 1996.

Chapter Three Building the Environmental Capacity of MFIs

3.0 Potential and Challenges

Evidence suggests that the environmental performance of many of the environmentally-troublesome micro-enterprises can be improved. There is no single idea or method that can achieve this. What is required is an array of methods and ideas based on sound business, community development and environmental practices that can be called upon depending on the situation. There are potentially as many solutions as there are problems. Some solutions will come very simply while others will require more thought, time and resources.

In order to be in position to assist micro-entrepreneurs, it is necessary for MFIs to begin to build their environmental capacity. This chapter describes the different avenues available to MFIs to develop their environmental management capacity in a cost-effective manner. It explains the skills and resources that need to be developed and focuses on those already available to MFIs that can serve environmental purposes.

3.1 Understanding Environmental Needs and Resources

The process of assessing environmental capacity can begin by asking the following basic questions regarding environmental resources and needs:

- v Resources
- v What in-house environmental expertise exists in the qualifications of lending officers and other staff?
- v Can in-house skills and practices employed in other spheres of activities be used to achieve environmental ends?
- v What experience has been gained through past projects?
- v Are there institutional arrangements already in place which might facilitate a stronger environmental management of loans? If not, what needs to be done?
- v What environmental and other relevant resources and expertise can be found through NGOs, universities, research institutes, local consultants and implementing agencies?
- v What resources can government departments offer?
- v What are the practices of other micro-finance organisations in this area? Is there potential for collaboration? What can be learned from their experiences?

Needs

- v What sectors and enterprises require the greatest environmental management?
- v Considering recent trends in loans practices, will there be new areas of economic activity that will require environmental management?
- v How complex are the environmental management needs of your MFI?

3.2 Skill and Knowledge Transfer

One of the challenges for MFIs is to begin to evaluate the loans they are making from an environmental perspective. Evidently, this ability will be built slowly but there are a number of avenues open to speed this process up, the first being through skill transfer. Many of the skills as well as the knowledge developed in other aspects of MFIs' work are transferrable to environmental management. For example, the skills and judgement that MFIs use to determine and monitor the impact of micro-enterprises on communities are not very different from those required to undertake an environmental assessment. CIDA, Asia Branch, in its effort to promote the use of environmental assessment amongst community development practitioners, stresses reliance on community development skills (Pallen 96). Business skills can contribute as well. There are many shared ideas and values between good business practices and environmental management such as maximising the use of resources and eliminating waste.

Finally, MFIs should not underestimate the extent to which they have already amassed important environmental experience. In the past, MFIs have promoted labour-intensive production, recycling and other activities which have positive environmental implications. They have observed the impressive way in which most micro-entrepreneurs have learned to do more with less. These experiences and any involvement in the more environmentally hazardous enterprises outlined earlier in Chapter Two provide important insight into environmental problems and solutions.

3.3 Strengthening Environmental Management Capacity

Each MFI must decide how it wishes to strengthen its environmental management capacity and take the necessary internal measures to ensure that the proper support mechanisms to do so exist. MFIs are best suited to determine how such support mechanisms can be integrated into their operation. If one does not exist already, a forum should be established for reviewing environmental matters and providing project managers with environmental support. This may mean creating a working committee or delegating a staff member as the environmental focal point. A local consultant can be hired to coordinate environmental efforts.

This *Sourcebook* stresses the importance of MFIs collaborating with other groups. However, any collaboration should not detract from building in-house environmental knowledge and judgement. The issue of building confidence is critical. The environmental decision-making skills required are not complex and can be easily developed. Learning by trial and error is part of this process and should be encouraged.

MFI staff are often overworked and there will be a temptation to delegate responsibilities. This should not occur until staff has an opportunity to feel secure about their environmental expertise. Even if a third party is hired to manage environmental matters, project managers must still be able to evaluate the work done.

Given an endless number of problems to be solved and areas of capability to develop, during initial stages, MFIs should be selective and focus on goals that are easier to accomplish and will allow the MFIs to build confidence. The majority of the changes in micro-enterprise operations necessary to bring about improvements in environmental performance represent small adjustments in present practices. Such ideas can be given early priority. Also, planning can begin as soon as possible for special challenges such as a sector of activity supported by a MFI that is highly problematic. (This may or may not be one of the activities identified earlier in section 2.1.)

3.4 The Practice of Environmental Assessment

One of the key environmental management skills for MFIs to develop is the capacity to undertake environmental assessments. Environmental assessment (EA), sometimes referred to as environmental impact assessment (EIA), is *the practice of evaluating and anticipating the environmental impact of a project, identifying mitigation measures and, if necessary mapping out alternatives*. EA is a project planning and management tool which can be used in creative ways to enhance project performance as well as to help accomplish a variety of environmental, social and economic objectives. Good EA teaches that a project is to be understood from the larger perspective of the long-term well-being of the community and the environment.

EA is used from the beginning to the end of a project's design and implementation as a *control* against any harmful consequences of a project. EA can be employed to compensate for shortcomings in the project planning process such as a lack of consultation with a local community (Pallen 1996).

Historically, EA has been used to evaluate the environmental impact of larger-scale economic and infrastructure projects. Hence, many of the standard practices associated with EA work for larger projects and are not transferable to smaller-scale activity. The need to control costs, and other special circumstances related to the scale of projects like micro-enterprises, requires that a new approach to EA be developed. Elements that come into play in creating this new approach to EA include transferring existing analytic and community development skills to the EA process, relying on communities and project beneficiaries to provide expertise and guidance, and collaborating with other groups as a means to build common EA capacity and share costs (Pallen 1996).

The use of EA to evaluate MFI activity presents special circumstances, the most obvious being the large number of loans that are made for small amounts to a wide array of economic activity. Some of the projects supported by MFIs, such as agriculture and aquaculture based enterprises and small-scale industry can be individually assessed. Activities that involve a high number of loans to a large number of clients such as small poultry operations cannot be assessed on an individual basis. In such cases, a sector or community level analysis would be more appropriate. What is the socio-economic and environmental impact on a community when you introduce a thousand small-scale poultry operations? How can a community prepare for the eventual success

of a livestock project that will create related industries such as tanneries, meat processing and animal slaughterhouses? These are the sorts of questions that can be answered from a sector or community level perspective.

EA involves finding tradeoffs between environmental and economic and social objectives and identifying measures to mitigate environmental impacts. In enterprise “A”, there is some environmental impact and the employment gains are relatively significant. There is also the possibility to mitigate environmental damages through protective measures at some additional cost to the entrepreneur. In the case of enterprise “B”, the environmental impacts are significant and cannot be mitigated. The employment gains are minimal. These are the sorts of scenarios that MFIs will learn to evaluate through EA.

EA is not a perfect tool. It cannot correct every imperfection in the planning process. All the same, it offers enormous potential to MFIs to generate environmental and other forms of information, strengthen communication mechanisms between MFIs and clients, and foster innovation.

For sector-specific environmental guidelines and greater detail on applying EA, see Chapter Five.

3.5 Understanding Environmental Impact

To use EA effectively, MFIs must learn to discern the environmental impact of economic activities, and determine whether the activities are *sustainable* over the long term. Sustainability is best understood and defined according to local circumstances and through the involvement of local people. Such a “situational definition” is dependent on the type of economic activity being assessed and possibly any number of social, economic and environmental factors (Pallen 1996). As the IUCN (1995, 1) points out, assessing sustainability involves “setting common goals, identifying conflicting interests, devising and applying strategies and ways of measuring. It is a learning process involving reflection, argument, negotiation, strategising, measurement, action and continuous reassessment”.

In an effort to help project managers develop appropriate definitions, the World Bank has issued “Project Level Guidelines for Environmental Sustainability.” Every ecosystem has a threshold for absorbing deterioration and a certain capacity for self-regeneration. These thresholds are defined by the World Bank (1991b, 51) as follows:

- ▼ Waste emissions from a project should be within the assimilative capacity of the local environment to absorb without unacceptable degradation of its future waste absorptive capacity or other important services.
- ▼ Harvest rates of renewable resource inputs should be within the regenerative capacity of the natural system that generates them; depletion rates of nonrenewable inputs should be equal to the rate at which renewable substitutes are developed by human invention and investment.

The aim of this model is to curb overconsumption and unacceptable environmental degradation. But lacking in a scientific basis, this definition provides only general guidelines for determining

the sustainable use of inputs and outputs. The World Bank therefore recommends adopting a “prudent rule of thumb” to serve as a check against overconsumption rather than a “theoretically unique scientifically precise number” (World Bank 1991a, 52).

The notion of a flexible rule of thumb is very important in the world of micro-enterprises where sustainability can often seem unconventional and must be defined from a larger perspective of community well-being. As Chambers and Conway (1992, 27) points out, “a slope may erode, but farmers may be trapping the silt lower down to make new fields. From a technical physical angle, this gets bad marks for (a traditional definition) of sustainability.” Chambers and Conway also present the example of a secondary forest that may have more value to local people than a primary forest. Similarly, discarded waste from one micro-entrepreneur can often find itself back into the production process of another micro-entrepreneur. Yet, not everything works out so easily. Sometimes “community members with divergent interests may have conflicting perceptions of sustainability. Changes in patterns of resource consumption affect people in different ways. An impact that is viewed as equitable and sustainable by one group may not be by another” (Pallen 1996, 13).

3.6 Information Management

The importance of building and managing information should not be underestimated. When properly managed, information will greatly enhance environmental management capacity. Secondary sources of information can be helpful in constructing a framework for understanding the environmental impacts of a particular economic activity. Information relevant to small economic activity and the environment can be compiled from an endless number of sources.

The groups noted in section 3.7 as potential partner groups are sources of important secondary information. One of your potential partner groups may be interested in seeing an information bank being developed and jointly shared and maintained. Also, organisations such as the European Commission (see Director General for Development 1991), World Bank (see World Bank 1991a and 1991b) and the Asian Development Bank (see Asian Development Bank 1991) have published environmental guidelines for agriculture, forestry, and industrial activity. The United Nations Environment Programme has produced a diskette that includes information on cleaner technologies (see Chapter 4). CIDA has collected, in diskette form, a wide range of sector guidelines relevant to community-level economic and development projects (see Pallen 1996). Groups such as the Intermediate Technology Development Group and Appropriate Technology International have a great deal of information on small-scale production technologies.

New information and communication technologies such as the Internet have, as Holley (1995, 32) suggests, a significant potential to “enable rapid changes in economic culture” at a community level. The experiences of a farming co-operative in Lima can now be easily shared with microcredit practitioners in Calcutta. A community group in Dhaka faced with hazardous discharges from a local textile operation can receive overnight advice from a South African pollution prevention specialist via the Internet. Every effort should be made to exploit this potential.

It is noteworthy also that the practical experience in environmental management gained by MFIs will often be more valuable than secondary sources of information and should be properly documented.

As information is gathered, it is important to find ways to share it with micro-entrepreneurs who lack information about technological processes, ways to improve resource efficiency and workplace safety. The information provided to micro-entrepreneurs must be on terms they can work with. For example, it has been pointed out (Anderson 1994, 29) that sharing the benefits of improved soil conservation techniques with small-scale farmers is difficult because the techniques are often “information intensive”.

3.7 Collaborating with Partner Groups

Although much can be accomplished independently, more can be gained by working with partner groups. Partnership presents the possibility of using knowledge and expertise from a number of fields, all necessary for tackling environmental problems. Partnership is both an opportunity to resolve environmental problems and to introduce new ideas, perspectives and expertise into the field of micro-credit lending. Strategic alliances can be developed with different groups based on shared interest. MFIs can work with different groups on different challenges. There is an opportunity to understand and resolve problems in greater depth.

MFIs should begin by contacting established partners to determine their abilities and interest regarding a given topic. It is quite likely, however, that MFIs will find it more rewarding to develop new partnerships. Due to the cross-cutting nature of the environment and micro-enterprise question, there are many different organisations that have a stake in a clean environment. Many of these groups are challenged by budget cuts. The need to share resources and encourage collaborative strategies has never been greater. The experience of MFIs in providing financial services to entrepreneurs and implementing cost-recovery schemes would be a key contribution in developing appropriate environmental management activities.

One element of a successful strategy is to make the best use of the strengths of different groups. For example, groups in the environmental field possess knowledge which, combined with the experience and resilience of micro-entrepreneurs and the know-how of MFIs, creates a fertile ground for innovation and business development. The main role of the micro-entrepreneurs and MFIs in this context is to keep new partner groups focused on the main objective of creating viable micro-enterprises. Following is a list of potential partner groups:

- ▼ Environmental Groups both Local and International.
- ▼ Multilateral and Bilateral Donors.
- ▼ Embassies from countries such as Canada that provide assistance to micro and small business.
- ▼ Local Municipal Departments.
- ▼ Science and Research Groups.
- ▼ Community Groups.

- v Trade and Business Groups both formal and informal.
- v Housing and Health Advocate groups.
- v Other MFIs.
- v Public and Private sector Agricultural Research Institutions.
- v Mid- and Large-Scale Manufacturers.
- v Urban Planners.
- v University Departments.
- v Local Consultants

Different forms of collaboration can be envisaged. For example, even when formal partnerships cannot be developed, groups remain sources of information, technical expertise and possibly financial support.

3.8 Working with Communities & Micro-Entrepreneurs

The beneficiaries of MFI loans are best suited to understanding the environmental impact of micro-enterprises. The next best group are the communities in which micro-enterprises operate. Working with both micro-entrepreneurs and communities will enable MFIs to differentiate between environmental protection practices that are essential for environmental and community well-being and those that unnecessarily interfere with the operations of micro-enterprises. In addition, there are many benefits from involving communities and entrepreneurs. Such involvement:

- v Provides opportunities to influence and control and learn.
- v Builds skills and knowledge that entrepreneurs carry with them to other activities.
- v Creates programming options by tapping into the knowledge and skills of entrepreneurs.
- v Offers intrinsic value for participants in the form of building confidence and stimulating interests.
- v Provides information on community goals, attitudes, values, preferences and priorities which can serve long-term planning needs.
- v Increases awareness of the causes and solutions of environmental problems.
- v Lowers costs.

Micro-entrepreneurs may be reluctant to participate in activities to improve the environmental management of their enterprises. The challenge for MFIs is to identify and work with factors that encourage the involvement of micro-entrepreneurs. Micro-entrepreneurs will almost certainly not show an interest if there is no financial payback or if the payback is only long-term. Fortunately,

much can be done in the short term to facilitate the achievement of both environmental and business goals, a “win-win” situation.

It has long been the practice to underestimate the extent to which a community understands and cares about its environment (Pallen 1996). Community members’ knowledge can be essential in understanding the wider impacts of micro-enterprises and in finding solutions. Community members can be affected in different ways by an environmental problem or resource use patterns. Key stakeholders may include members of a community who have no direct involvement in a given enterprise. On a more general level, community members offer valuable knowledge and insight on everything from resource use patterns to changes in environmental conditions.

It is likely that, provided the right approach is found, entrepreneurs and communities will participate in collaborative environmental management of micro-enterprises. The experiences of the International Labour Organization (see Chapter 4) confirm this. Although collaborative involvement may, in some cases, be time consuming, getting micro-entrepreneurs on side on this issue will ensure that approaches to environmental improvement are adapted to their special characteristics and conditions.

3.9 Participatory Rural Appraisal

To promote the active involvement of entrepreneurs and communities, MFIs should begin by using the methods they already employ to encourage participation. In addition, it is recommended that MFIs consider the potential of some of the techniques associated with Participatory Rural Appraisal (PRA). Over the last 10 years, PRA has spread rapidly throughout the developing world. The aim of PRA is to give project beneficiaries greater control and involvement in the planning and implementation of activities meant for their benefit. PRA is a general term describing a collection of techniques which enable local people to “share, enhance and analyse their knowledge of life and conditions, to plan and to act” (Chambers 1992).

Many PRA techniques such as resource mapping, landscape analysis and environmental impact matrices are designed specifically to focus on environmental issues. PRA has a wide potential in both rural and urban settings (Huddock 1995). For MFIs not familiar with PRA, most countries have reputable groups with extensive PRA experience which could assist MFIs in applying PRA locally.

3.10 The Training of Beneficiaries

Training can be used to develop the skills and knowledge of staff, partner groups and micro-entrepreneurs. Costs can be shared between partners. Training can be provided to micro-entrepreneurs on a stand-alone basis or packaged with training in other areas. In order to ensure that training is relevant, MFIs should make every effort to involve clients in the development of all training components and, where possible, have micro-entrepreneurs train each other. Maera's (1994, 34-35) recommendations for ensuring successful product development training of informal sector workers are applicable to environmental training:

- v Be as practical as possible.
- v Be as short as possible.

- v Take the participants away from their work as little as possible.
- v Stimulate a process of thinking and designing instead of offering a single solution.
- v Conduct training in the language of the participants and the trainer.
- v Encourage feedback from the participants.
- v Work with groups of artisans from the same sector.

3.11 Promoting Technological Change

Promoting technological change in the production practices of micro-entrepreneurs is the most direct way to eliminate environmental problems. The objective is to promote cleaner production. Cleaner production is defined (UNEP 1994, 43) as the “continuous application of an integrated preventative environmental strategy to processes and products so as to reduce risk to humans and the environment.” Invariably cleaner production means more efficient production.

A considerable amount of research and critical thinking has gone into looking at how micro and small-scale productive enterprises can be improved. Important knowledge and technology exist regarding processes, materials, equipment, tools, products, and skills, and the organisation of production and marketing to improve efficiency. Box 3.1 demonstrates that many sound practices are already utilised at the micro-enterprise level.

In the small-scale agriculture sector, there is an equally large opportunity for improving technical performance (Chambers and Conway 1992, 23):

The livelihood potentials of resource use have been habitually underestimated. The underestimation has been made in two domains. First, in small-scale farming there is better understanding now that for the complex, diverse and risk-prone agriculture of much of the South, bio-economic productivity is enhanced and stabilised not by simplifying with high-input packages, but by complicating and diversifying with multiple interlinking [uses]. Mixed cropping, agroforestry, aquaculture, cut and carry stall feeding of livestock, the creation defined (UNEP 1994, 43) as the “continuous application of an integrated preventative environmental strategy to processes and products so as to reduce risk to humans and the environment.” Invariably cleaner production means more efficient production.

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Box 3.1 Informal Sector Trade Fair: El Canelo de Nos

El Canelo de Nos, a Chilean NGO, organised a fair to encourage the necessity to link technology to environmental aspects and economic interest. In order to identify exhibitors for the Fair, the technicians of El Canelo de Nos visited NGO regional fairs, independent working class inventors and other sources in search of alternative technologies. The final selection for the year in question, 1992, included 110 specific technologies originating from three different sources; El Canelo de Nos, professionals working for other support organisations, and traditional technologies that had been salvaged and improved upon by NGOs. Exhibitors from Chile and the rest of Latin America, Asia and North America participated in the Fair. The Fair organisers considered it to have been a success.

Source: Bengtsson 1995, 23.

of livestock, the creation and protection of micro-environments which concentrate soil, water and nutrients and intensified highly diverse home gardening are labour- and livelihood-intensive responses to risk and to rising population-to-land ratios.

These innovations need to be promoted on a wider basis. In some cases it will be more appropriate to develop new technologies and processes. This is an area of micro-enterprise development where there is relatively more experience collaborating with entrepreneurs. One technique already used by MFIs is Participatory Sub-sector Analysis (PSA) (Chen 1996, 128-33). PSA involves working with micro-entrepreneurs and their employees to examine every stage in the production or distribution of a particular good or service to identify inefficiencies. This

Box 3.2 Waste Minimisation: Project DESIRE

In India, Project DESIRE (Diverse, Environment, Simple, Innovative, Rational, and Economical) worked with 12 small-scale enterprises to identify different waste minimisation options. The companies were in the textile, pulp and paper, and pesticides industries. Some 540 waste minimisation options were identified. Over 38% could be implemented within 15 months. Another 32% of the options were deemed feasible; implementation of these options has already started. Only 30% of the options generated proved to be not feasible, and had been rejected by the participants. For these options, the technology was either not yet available or not yet available at an appropriate scale for small-scale industries. However, companies identified other methods for waste savings. The overall payback time of the 196 waste minimisation options implemented in project DESIRE was less than 6 months.

process can be used to understand a whole array of factors related to the production process,

suite Box3.2

The implementation of these waste minimisation measures has contributed significantly to environmental improvement in areas like:

- P** Minimisation of waste water discharge.
- P** Minimisation of air emissions.
- P** Minimisation of solid waste generation.
- P** Conservation of materials, energy, and waste.
- P** Reduction of the use of toxics.
- P** Minimisation of health and safety hazards both in the shop floor and local community.

The results of project DESIRE reveal the following important features of the waste minimisation potential for small-scale enterprises:

- 1.** Waste minimisation is diverse; waste minimisation is essentially a problem solving strategy rather than a solution; waste minimisation puts emphasis on examining the waste generating process, employing a preventive mind-set to develop solutions. A variety of technical operational, educational and managerial practices can be used:
 - P** Good housekeeping
 - P** Input material change
 - P** Better process control
 - P** Equipment modification
 - P** Technology change
 - P** On-site recycling
 - P** Useful byproducts
 - P** Product reformulation
- 2.** Waste minimisation protects the environment.
- 3.** Waste minimisation is simple. Waste minimisation is to a large extent based on common know-how and entrepreneurship. Simple but effective.
- 4.** Waste minimisation is innovative; the waste minimisation concept might boost innovations in processes, products and/or technologies.
- 5.** Waste minimisation is rational: Achieved by the rationalisation of production.
- 6.** Waste minimisation is economical. The rationalisation of the production normally improves the material, water and energy efficiency which, in turn, might create attractive financial benefits.

Source: Van Berkel 1995.

working environment, technology, resource use, and end use of waste. The DESIRE project in India, described in Box 3.2, is an interesting example of applying existing knowledge and working with entrepreneurs to find new ways to minimise environmental impact and reduce costs.

Certain criteria should be respected when promoting or developing a new technology or process (Hyman 1992, 7-8). These include:

- ▼ Economic viability: financial benefits to users in return for their own investment of time and money.
- ▼ Cultural acceptability.
- ▼ Improved resource efficiency.
- ▼ Reduced environmental risks.
- ▼ Improved health and safety standards.
- ▼ New technologies should not lead to the displacement of workers.

Given the small margins within which micro-entrepreneurs operate, the ability to pay for new technologies will sometimes be an issue. On this concern, Hyman (1992, 8) adds:

As much as possible, technologies should be chosen that are affordable enough and beneficial enough for small-scale producers to adopt without the need for extensive subsidies in the long run. . . In the dissemination phase where the benefits of a productive technology can be appropriated by the users, the full capital and operating, maintenance, and replacement costs should be borne by the users so that the technology can be

Box 3.3 Centro de Gestion Tecnologia (GEGESTI)

In Costa Rica, Centro de Gestion Tecnologia (GEGESTI) organised a contest in the food industry to collect 50 suggestions on environmental and production efficiency improvements. The competition offered the opportunity to make people working in this sector more aware of the benefits of greater environmental efficiency. The suggestions were collected and developed into a manual. The suggestions provided ways to reduce pollution, generate less waste, and reach higher efficiency in the use of resources per unit of output. Businesses participated willingly in the contest. GEGESTI gave awards for the best suggestions. This information transfer project revealed that many of the suggestions made in the manual had already been implemented by businesses as cost reduction measures.

Source: Feoli 1995.

sustainable after the project is over. In exceptional cases where the users would have to bear the costs while the benefits accrue to others through environmental externalities, there may be a social justification for some subsidisation.

3.12 Building Networks and Flexible Enterprise

The strength of MFIs in promoting environmental change is their ability to reach out and influence a large number of micro-entrepreneurs either by providing information on a collective or individual basis or something more substantial. If the ideas or information that MFIs are promoting are sound they will be adopted quickly and spread among micro-entrepreneurs. Below are a number of ideas on how to work with micro-entrepreneurs at a group level:

- v Identify avenues for promoting ideas, technologies and products to micro-entrepreneurs with shared interests.
- v In the early stages, work with micro-entrepreneurs who already recognise that their inability to manage environmental matters is a fundamental business problem. They are more likely to accept help. Collaborate with these individuals to create role models, gain information and experience that can be used with others on a broader basis.
- v It is better to work through associations, both informal and formal, set up by the entrepreneurs themselves. In addition to formal associations there are often both modern and traditional groupings and networks of entrepreneurs and artisans existing in most developing countries (Van Dijk 1995).
- v Only after it is determined that no useful group of entrepreneurs already exists, should MFIs attempt to organise entrepreneurs. These should be loose networks focused on shared priorities. The entrepreneurs should determine the level of coordination and organisation that is required.
- v An entrepreneur group does not have to be sector specific. It can be based instead on a given community where entrepreneurs from different sectors come together to examine

Box 3.4 The Kenya Ceramic Jiko & Diambar Stoves

The Kenya Ceramic Jiko (KCJ), an energy efficient charcoal stove made of metal and ceramic parts, makes a great non-financial assistance story. A USAID funded group supporting new stove development, investigated not only existing stove designs but also the existing stove industry to find ways to improve the energy efficiency of stoves. The group found a thriving metalworking sector in Nairobi and decided to find ways to get the sector involved in development and dissemination of the new stove technology. The group worked with Master artisans in creating a new stove design. Medium-sized ceramic product firms, with some training from the programme, began producing ceramic liners which were not being produced satisfactorily by poorer micro-entrepreneurs.

The KCJ's success has helped not only thousands of artisan entrepreneurs who make and sell the stoves but also tens of thousands of households in eastern and southern Africa that save money and time through using more efficient cooking devices. KCJ promoters concentrated on encouraging existing stove makers to produce the new model using existing market channels for stove sales while letting entrepreneurs, big and small, decide upon distribution, pricing and other marketing matters themselves. Today, tens of thousands of the stoves are produced and sold each year throughout southern and eastern Africa, responding to the problem of fuelwood scarcity in urban areas.

problems and solutions.

MFIs should consider facilitating the creation of a public space that could act as a centre for networking, sharing ideas, and promoting innovation and research and development. Such a centre:

- v Could help smaller groups form a range of networks.

- v Could provide access to secondary information on environment and micro-enterprise development issues.
- v Could be cost-shared by a number of groups and possibly operate out of an existing building such as an MFI extension facility.
- v Should be physically accessible to entrepreneurs.

Other network promotion ideas that are simple and effective such as promoting environmental trade fairs (see Box 3.1) or environmental contests (see Box 3.3) are also worth considering.

3.13 Working with Mid- and Large-Size

Companies

Collaborating with mid- and large-size companies to develop and promote environmentally sound technologies and products for use in the micro-enterprise sector opens up new possibilities. Mid- and large-size companies can contribute knowledge and technology at different stages of micro-enterprise production or can produce complementary products. Larger firms are better equipped than micro-enterprises to do research and development and have capacities micro-entrepreneurs do not have such as bookkeeping (USAID 1995b). Having a larger company working with a large number of micro-enterprise eases the responsibility of MFIs. Larger companies can handle the production of those components of a product that micro-entrepreneurs cannot produce without significant environmental impact. They can also be called upon to produce more efficient technologies that micro-entrepreneurs can use in their operations. Better financial returns for all parties would be the basis for ensuring success in such a collaboration. As shown by the example of the energy efficient stoves discussed in Box 3.4, larger firms and micro-entrepreneurs have successfully collaborated in the past to achieve economic and environmental gains.

Diambar Stove

The Senegal Diambar stove is an adapted version of the Jiko charcoal stove. In less than four years, more than 24,000 Diambar stoves have been sold in Senegal. The project relies on commercial incentives for production and distribution. About 35 small-scale artisans actively produce the metal claddings for, and assemble, the stove. Most of the liners have been made by one medium-scale mechanised firm but some are made by a small women's pottery group. Currently, the stove is actively sold by more than 125 sales agents or women's groups. The Diambar uses 46 per cent less charcoal than Senegal's traditional all metal stove. On average, a household can save 570 Kg of Charcoal annually worth US\$108 per year.

Source: Hyman 1996.

3.14 Waste Exchange & Treatment

Waste Exchange

It has been said that everything that has a value will be reused and most waste is valued for one reason or another. Given the wide number of sectors represented by MFI beneficiaries, a number of different forms of waste exchange can be envisaged. For example, “in the process of making silk, the [silkworm] cocoons are boiled and the silk [is processed], the dead worm is however wasted. Dead worms could be sold or distributed to fish farmers, instead of thrown out” (Chicoine 1996, 38).

Waste Treatment

For toxic, non-reusable waste, it may be possible to establish collective treatment systems. There are successful examples of the collection of hazardous wastes from small-scale enterprises in Asia and the Middle East in which entrepreneurs agreed to relocate to share collective services (Bartone 1995, 6). In Hong Kong, small enterprises expressed a willingness to store hazardous substances until they could be collected (Lei and Yang 1993 in Bartone 1995). Although collective treatment may involve difficult issues such as relocating micro-enterprises, it offers a number of advantages (Uriarte 1982, 55). Such an approach:

- ▼ Minimises the problem of policing.
- ▼ Minimises the problem of lack of trained personnel.
- ▼ Solves the problem of where to find space to locate treatment equipment in the already cramped workspaces of micro-enterprises.
- ▼ Offers economies of scale.

3.15 Financing Environmental Management

Environmental management need not be costly. While MFIs could assign a small budget to cover environmental management overhead costs such as planning, research, publicity and coordination, a partner group could be approached to cover all or a portion of these costs. MFIs might also consider dedicating a small percentage of their operating budget to a “Green Fund” to support the creation of “green micro-enterprises” as proposed in Appendix 1. The principles of cost effectiveness and financial self-sufficiency should, to the greatest degree possible, govern approaches to covering the cost of training or of facilitating the purchase of environmentally sound technologies. Groups such as ACTUAR (see USAID 1995d) have demonstrated that MFIs can provide training that clients are willing to pay for because they feel it is in their financial interest to do so. Environmental training should follow the same axiom. Also, MFIs can work with entrepreneurs to alter financial and business practices for environmental purposes. For example:

The intensification of fish production, as a means to raise income, involves an increase of fertiliser and poison use, which in return increases the environmental impacts, the risk of health hazards and of fish disease outbreaks. By contrast, a better marketing strategy, one

increasing the price given for beneficiaries' fish, without raising the cost for consumers, can raise the income of the producers without any additional environmental or health risk [or added cost to MFIs or the micro-entrepreneur] (Chicoine 1996, 37).

3.16 Regulation

This chapter has stressed the importance of using the carrot and not the stick. Yet, there may be situations when some form of enforcement is useful. An option not available to MFIs is the use of formal environmental regulation. MFIs are in no position to levy pollution charges or specify pollution limits. Such an approach would imply that MFIs know a great deal about the contamination caused by beneficiary activities and could effectively enforce their own standards. It must be noted, however, that much of the environmental protection achievement in western economies has been the result of increasingly tighter regulation.

Environmentally Tied Financing

MFIs can use their own forms of in-house "regulation" such as requiring the environmental training of entrepreneurs or their compliance with mitigation measures as preconditions for receiving loans or future financial support. MFIs can also learn about the conditions under which micro-enterprises can be pressured into following up on environmental measures. There is family and peer pressure. There is also what Bengtsson (1995, 26) describes as the "organic relationship to the community which makes entrepreneurs sensitive to local opinion." Peer groups may be encouraged to develop their own standards.

Chapter Four Environmental Health & Safety Practices for Micro-Enterprises

4.0 Introduction

MFIs should be greatly concerned with the inter-relationship of micro-enterprise workplace safety, the environment, and human health. The limited research examining micro- and small-scale enterprise indicates that the environment, worker health and safety and profitability are often all severely jeopardised by poor workplace environmental health and safety standards.

Box 4.1 Jua Kali (Hot Sun) Industries

A number of micro-enterprises in Kenya are known as "Jua Kali" or "Hot Sun" industries because of the places in which they operate. The sites are not fixed premises; rather they commonly consist of roadsides, open spaces and paved areas in front of buildings. Most Jua Kali workers operate illegally and are subjected to evictions and the confiscation of their materials or products by local police. Also, operators can move any time they like to another open area or roadside. The workers are exposed to hot sun, rain and changes in the weather, all of which affect their health. Jua Kali entrepreneurs include those involved in motor vehicle repair, furniture-making, fruit and vegetable selling, metal working and second-hand clothes selling, the latter popularly known at MITUMBA. A survey carried out in 1989 revealed that workers in these sectors are not aware of the occupational health hazards they are exposed to. These hazards were identified as follows:

1. Physical Hazards

These include noise, heat and cold. Noise seems to be the biggest problem for most of the workers who carry out their processes together. Many other workers, such as fruit and vegetable sellers, whose actual work does not produce noise are nevertheless exposed to it. Exposure to too much noise can have emotional, auditory and physiological effects. It is known, for example, that continued exposure to excessive noise can lead to fatigue, anger and irritability. Repeated exposure to high noise levels such as those affecting Jua Kali can also damage hearing.

The risk of exposure to heat is common, since these workers operate in outdoor areas, except for a few organised workers who have made temporary sheds. Although people do become acclimatised, most of these workers, as a result of the combined effects of malnutrition and exposure, suffer from headaches, heat cramps and dizziness.

2. Chemical Hazards

Chemical hazards are common among the motor vehicle repairs, since they deal with a number of acids. Automotive spray painters are exposed to solvents and paints which may irritate the skin, causing various diseases. Mechanics risk lung cancer, carbon monoxide poisoning, and exposure to lead and asbestos. Welders are exposed to toxic metals and toxic gases that may lead to metal fume fever.

3. Biological Hazards

These include the hazards of organisms such as bacteria, viruses, fungi and parasites that cause disease in the workers exposed to them. Malaria is common because mosquitoes like breeding in the stagnant water where the Jua Kali have dumped their unused items and materials. Diarrhea and vomiting is also prevalent because of poor hygiene standards and living conditions.

4. Psychosocial Hazards

The main psychosocial hazards come from harassment law enforcement officials, which brings on a lot of stress and anxiety and which may predispose the Jua Kali to other major diseases such as ulcers, hypertension, alcoholism and possibly drugs.

5. Ergonomic Hazards

Improvised tools and incorrect postures during long working hours, combined with other problems such as malnutrition, transform simple aches such as knee pains into more serious problems.

6. Washing and Sanitary Facilities

In the absence of such facilities, workers improvise for sanitary convenience, contributing to pollution. Mosquitoes, flies and stench are normal occurrences.

7. Buildings

Buildings used are typically tiny, congested and unsafe. These temporary buildings can be relocated any time.

8. Equipment

Due to poor quality equipment, the process to produce a product is time-consuming, requiring greater physical energy. Additional problems include the lack, or improper use, of protective equipment.

Source: Atambo 1995.

As important as it may be for micro-entrepreneurs to seek higher energy and resource efficiency, there is even greater social and economic promise in building environmentally-sound practices for worker health and safety.

This chapter underscores the potential for MFIs to encourage workplace health and safety improvements and the benefits of those improvements. Some of the subjects covered here have been examined, in part, in earlier sections of the Sourcebook. However, given their importance, they are reexamined in this chapter from an environmental health and safety perspective.

4.1 A Synopsis of the Problem

The primary environmental health and safety concerns are:

- ▼ The constant threat to workers from the presence of hazardous substances.
- ▼ Dangerous working conditions and unsafe work practices.
- ▼ Inadequate, or non-use of, protective equipment.
- ▼ Inappropriate work site location.
- ▼ Lack of health facilities such as first aid clinics and proper sanitation services.
- ▼ Information deficiencies.
- ▼ Low priority given by entrepreneurs and workers to problems.
- ▼ Diminished Productivity due to sickness and injury.

The poverty, malnutrition, and illiteracy that are part of the working context of the micro-enterprise help to make these poor health and safety conditions more lethal. Social problems such as alcohol or drug abuse on the work site often add another dimension to the problems encountered. Some hazards, such as those related to working without proper safety equipment, are a part of the daily routine while others can be brought on by emergencies, inexperience and haste. Other risks are seasonal or climatic such as those related to hot weather conditions (Shaver and Tong 1991). The description in Box 4.1, of the Jua Kali industries in Kenya, provides a cross sectoral view of micro-enterprise health and safety challenges.

4.2 The Chemical and Pesticide Risk

It is widely recognised that chemicals play an important and productive role in many areas of urban and rural economic activity. Pesticides can overcome problems caused by pathogens, weeds, insects and various other pests that affect agricultural production (ILO 1992). However, the use of chemicals and pesticides carries enormous risks and responsibilities that are not always fully appreciated. The concern is not so much with the chemicals, but rather with how they are handled, stored, transported and used. According to the ILO, each year there are hundreds of thousands of cases of mishaps related to chemical use in the workplace resulting in injury and death (ILO 1994b). The “toll on workers, production, property and the natural environment has now reached staggering proportions.” (ILO 1994b, 79).

Hazardous Materials

Micro-entrepreneurs, both rural and urban, widely use hazardous materials. We know, for example, that the beneficiaries of microcredit loans are using hazardous materials, in some cases through the encouragement of MFIs (Chicoine 1996). In rural areas, the main concern is the indiscriminate use of pesticides. Certain pesticides used extensively in small-scale agricultural activity are so lethal that their use is either banned or is being phased-out in countries such as Canada. The best current example of this is methyl bromide.

Characteristics of Hazardous Substances

Hazardous substances (hazardous materials and wastes from their use) pose a danger to workers, the community and the environment because they display one or more of the following characteristics:

- v Ignitable - capable of burning or causing fire.
- v Corrosive - capable of eating away materials and destroying living tissue on contact.
- v Explosive - can cause an explosion or suddenly release poisonous fumes when exposed to air, water, or other chemicals.
- v Toxic - poisonous, either immediately (acutely toxic) or over a long period of time (chronically toxic).
- v The Unforeseen - for example, “pesticides used to regulate plant and animal pests and unwanted weeds are often unpredictable. Target species can become resistant to pesticides. The chemical may remain in the crop, in the soil, drift to other areas, reach streams and water sources and thereby pose a threat to human beings and wildlife” (ILO 1992, 19).
- v Concealed - Often the dangers of hazardous wastes are not readily apparent. Their damage is long-term.

Box 4.2 Pesticide Use and Alternatives in Kenya

Improper handling of fertilizers and pesticides continues to endanger the lives of Kenya's small-scale farmers and their families according to a recent study. While Kenya's importation and use of agrochemicals has more than tripled in the last decade, the majority of farmers do not handle the hazardous chemicals safely. Various health complaints among villagers in rural Kenya have been linked to precarious application and storage patterns. [Some] 1,800 households were studied in 10 rural villages in an attempt to determine the magnitude of Kenya's agrochemical-related health problems. All farmers interviewed used chemicals extensively, but only 25% took any safety precautions during application. More than 60% of the farmers stored the chemicals in their homes in unmarked containers, despite the dangers associated with long-term exposure. When asked to interpret the instructions on a sample label, 60% of the literate respondents found the wording to be too technical. The researchers concluded that unsafe storage methods, improper protective clothing and ambiguous instructions contribute to the growing number of Kenya's accidental poisonings.

In response to these study results, the researchers, with assistance from the communities, initiated an intervention programme to promote safe procedures for handling and storing agrochemicals. Suggestions from the community included supplying farm workers with soap and water after spraying, and notifying the public about the dangers of using sprayers for purposes other than their intended chemical use. Community members also requested that manufacturers use straightforward warning labels which incorporate local names for the chemicals.

Source: Mwanthi and Kimani 1993.

Health Effects on Humans

Some of the health problems attributable to hazardous substances include skin irritations, respiratory problems, poisoning, and in some cases cancer. The ILO (1994b, 80) summarises the situation as follows:

Poisoning by chemicals can occur in several ways. The most frequent way is absorbing through the lungs by breathing in gases, vapours or airborne particles. Liquids can be absorbed through skin. Though least frequent, ingestion of chemicals through eating or drinking is more commonly found where personal hygiene is poor or where food is stored together with chemicals. Transmission of toxic chemicals from the pregnant women to the foetus through the placenta is also known.

It is difficult to say how many of the annual accidents reported by the ILO happen at the micro/informal level; no means exist to understand the extent of the problem. This is partly due to poor health services that cannot effectively diagnose serious maladies or people dying of mysterious causes. If the data on pesticide use in developing countries is any indication, however (see section 4.4), the number of such accidents is probably very significant. Given that many of the workers in the micro-enterprise sector are “poor, women [who bear children], unorganised and often uninformed regarding the risks, there is a strong basis to believe that health and environmental impacts of hazardous substances are much more severe than is known” (Matchaba-Hove 1996, 1).

The negative impacts of the improper handling of hazardous substances manifest themselves in other ways as well, the most striking example being the use of chemicals such as cyanide by poor people as a means of committing suicide. In Sri Lanka, this is a major social problem.

Environmental Impacts

In addition to their impacts on workers, hazardous substances can contaminate soil and groundwater, pollute air, destroy plants, vegetation and other forms of greenery, and kill or negatively affect wildlife.

4.3 Hazardous Substances in the Urban Environment

Up until the time that hazardous substances enter into the world of the informal sector, there are perhaps reasonable controls in place to ensure their safe use. However, regulation and enforcement of chemical use is non-existent in the informal sector. Governments in the developing world do not have the resources to enforce standards. Chemical manufacturers, importers and suppliers are responsible for providing information on chemicals in the form of safety data sheets. Unfortunately, by the time chemicals reach the informal sector, the data sheets are long gone as hazardous substances have been removed from their original container and resold in smaller quantities to a number of buyers.

It is not uncommon, for example, to be able to buy a product as toxic as DDT or cyanide in small quantities at a local market (Pallen 1989), and even if the buyer were to purchase the hazardous product in its original package, he/she may not be able to read the instructions. Rarely are entrepreneurs or their workers trained or equipped to safely handle these products.

In the absence of a regulatory framework and practical guidance, hazardous substances are then typically used in unsafe worksites that are often makeshift, disorderly, crowded, and suffering from poor lighting, noise, extreme temperatures, dust and fumes, and poor ventilation. These conditions combined with hazardous substances are a perfect opportunity for disaster.

Home-based enterprises (HBEs), which by all accounts represent a large proportion of all micro-enterprise activity, operate either directly in homes or on adjacent property in close proximity to children and other family members. As Tipple (1993, 532) points out:

The use of the home as a base for business has greatly assisted many in the informal sector to develop viable economic activity. . . However, in some cases health, safety and environmental conditions related to HBEs are very lax. This includes working in poorly-lit spaces, exposure to smoke, fire, burning liquids, excessive noise and the indiscriminate use of chemicals. One of the greatest concerns is the safety of children in this environment.

In Lima, Peru, small-scale foundries are dispersed throughout the city, typically in owners' homes. Foundry micro-entrepreneurs use bronze and aluminium as raw materials, processing the metal either in underground crucible furnaces or, in the case of the larger micro-foundries, in rotary kilns. Typically, no safety measures are used by the workers or their families, all of who are exposed to smoke and toxic gases from the furnace (Bartone 1995, 19).

4.4 Hazardous Substances in the Rural Environment

Even in the absence of reliable statistics, it is generally agreed that the incidence of chemical poisoning is highest in agriculture, meaning the rural entrepreneur is typically working in the most hazardous locational context. Pesticide (insecticide, herbicide, fungicide, rodenticide, etc.) use is far more prevalent than any other hazardous substance rural or urban and is growing. There is a disproportionate number of injuries and deaths related to pesticide use in developing countries as compared with its use in the developed world. As the ILO points out (1994b, 83), "industrialised countries use 80 per cent of the world's agro-chemicals but probably suffer only 1 per cent or less of all deaths due to pesticide poisoning; developing countries, on the other hand, suffer 99 per cent of the deaths while using 20% of the world's agrochemicals." The ILO, quoting a Canadian source, estimates that 10,000 people in developing countries die every year due to pesticides and 4 million show symptoms of poisoning (ILO 1994b, 83). The percentage of deaths and poisoning cases related to unsafe pesticide use is increasing in many parts of the developing world, in particular in Africa and Latin America (ILO 1992).

Problems with pesticides begin with the general lack of regulation and information to guide users in developing countries. The ILO notes that "extension services in many developing countries are insufficient, understaffed and without the necessary resources to reach all farmers with adequate advice. Illiterate male and female farmers can not read often complicated labels" (ILO 1992, 19).

The case study in Box 4.2 provides an examination of how the unsafe management of pesticide threatens the life of small-scale farmers, their families, and communities. It also demonstrates how farmers can provide valuable input on how to eliminate risks.

Pesticides are not the only hazardous substances used in farming activities. Fertiliser, equipment use and repair, animal confinement and slaughter, and stored products all present dangers related to hazardous substances (Shaver 1991). As noted in Chapter One, non-farm activities such as cotton ginning also make use of hazardous substances.

4.5 Sector Perspective: The Craft Industry

An examination of the craft industry provides a deeper perspective on the environmental health and safety hazards found at the micro-enterprise level. A Canadian craft person concerned with on-the-job health and safety led an investigation into the health risks associated with her craft. It revealed that her own health problems and those of her colleagues were work-related. She provided this description of the risks of her trade:

Box 4.3 WISE Training Methodology

The ILO has developed a training methodology entitled Workplace Improvements in Small Enterprises (WISE) designed to provide effective and affordable voluntary techniques for this sector. These techniques are aimed at improving working conditions and productivity to the benefit of the entrepreneurs and their workers. The methodology assists small enterprises in improving working conditions and productivity using simple, effective and affordable techniques which provide direct benefits to owners and workers.

The first comprehensive WISE pilot course was implemented in Kenya in 1992. During the course and activities preceding the follow up workshop held six months later, 193 areas requiring improvements were identified by the entrepreneurs. Of these, 123 were acted on and completed, while the rest were in progress or still being planned. Areas where results have been achieved:

- P** Material storage and handling
- P** Work station design
- P** Control of hazardous substances
- P** Productive safety
- P** Lighting
- P** Welfare facilities
- P** Premises
- P** Work organisation

In 1994, a further 220 participants were exposed to the methodology following three one day awareness workshops conducted in regional centres. Many of the improvements were highly innovative and long lasting and they have had a tangible impact on the productivity and working conditions in these enterprises. Participants indicated that they were also motivated to make improvements by their peers and by their understanding of the practical linkage of the methodology to the improvement of working conditions and productivity, in accordance with their pledge.

Source: Muchiri 1995.

Basically we are exposed to craft materials in three ways: by skin contact, by breathing and by swallowing. Because we cannot see, feel, taste, or smell a substance does not mean it is harmless. When we eat, drink, or smoke in the studio we are swallowing invisible particles of the materials with which we work. When handled without protection, some chemicals can cause skin rashes or burns or else can be absorbed through the skin into the bloodstream. Breathing dusts, fumes and vapours into the lungs may cause skin irritations, allergies, or even lung disease. Some chemicals form new and possibly more dangerous chemicals when they are processed by our lungs or intestines. Repeated use of some art materials such as fibre-reactive or porcine dyes will cause a severe allergic reaction in most people (Ontario Crafts Council 1988, 6-7).

Given what we now understand about the absence of the enforcement of health and safety standards, and dangerous working conditions, it is safe to assume that the micro-enterprise craft industry presents its share of dangers. The dangers associated with the batik and textile industries have been recognised (see Bartone 1995). The Fair Trade Federation (FTF), an association of wholesalers, retailers, and producers committed to providing fair wages and employment opportunities for craft artisans, has made workplace health risks a key priority. Table 4.1 provides further information on the hazards of various craft industries.

Box 4.4 Clean Technology in Asia

In a toy factory in Singapore, spillage of chemicals was a frequent occurrence, mainly because the containers were not secured to the tops of the work tables and could easily be knocked over. The problem was solved by using a glass container with a magnet at the bottom. The container was then placed on a heavy thick steel slab. Each container and magnet cost less than US\$5 and the steel slabs cost nothing because they were made from the company's own waste materials.

Workers in a small factory in the Philippines making electrical components had to dip wire cages filled with copper materials into a single open acid bath. Management decided to increase productivity and improve worker safety. A consultancy institute built a metal enclosure for the acid bath with glass windows to enable workers to see and control the process and be protected from acid fumes and burns. The workers were given appropriate training. The new method increased productivity by 53 per cent because six stations of the chamber allowed six batches of material to be treated simultaneously. Fatigue was also reduced with the introduction of mechanical lifting devices. All of this was done at a cost of US\$350 for the steel chamber, US\$0.80 for each worker trained and US\$100 for yearly maintenance.

Source: ILO 1994b, 86.

4.6 The Role of MFIs in Promoting a Healthy Working Environment

It is clear there is a significant absence of leadership in promoting a healthy working environment. Workers and entrepreneurs are being denied basic rights guaranteed to them under international conventions such as the Chemicals Convention 1990 (No. 170) and the Industrial Accidents Conventions 1993 (No. 174). These conventions specify that workers should be adequately and suitably informed of the hazards associated with their work and be regularly instructed and trained in the practices and procedures which help to ensure occupational health and safety.

MFIs recognise the unsafe working conditions in which micro-enterprises often operate. What has not been as well appreciated is the potential of MFIs to intervene in this facet of micro-enterprise activity. As Stratz (1996, 3) points out, it is a “fallacy that economic entities operating at a low technological level can not improve their health and safety standards.” More importantly, much can be accomplished at low or minimal cost. The rest of this chapter provides direction to MFIs on this topic that builds on the ideas found in Chapters Three and Five.

4.7 Planning Framework for Environmental Health and Safety

Environmental health and safety planning for micro-enterprises will be made easier if undertaken within a planning framework. The overall emphasis of such a framework should be to devise simple interventions that will prevent, rather than control, accidents and other mishaps. Potential areas of intervention include:

- 1) Procurement, and promotion of the use, of protective clothing and equipment.
- 2) Education campaigns (sectoral or community-level) and information dissemination.
- 3) Improving work site conditions including conditions at home base operations.

- 4) Packaging safety and health activities within a larger programme to address other related social or economic objectives such as alcohol abuse in the workplace or daycare services.
- 5) Improving the quality of tools and technologies and promoting the use of organic or less hazardous materials and good housekeeping practices.
- 6) Reducing and preventing dangerous emissions; improving waste treatment and reducing wastes.
- 7) Establishing and developing effective working relationship with local governments.
- 8) Encouraging entrepreneurial clusters and networks, farmers and associations to set up their own self-regulatory systems through safety and health committees (Ayree 1996, 19).
- 9) Developing methods for funding health and safety activities.
- 10) Working with beneficiaries to develop an inventory of hazardous substances (including wastes) associated with activity in their sector.

4.8 Working with Beneficiaries Revisited

Chapter Three stressed that the key to promoting higher environmental standards was to involve micro-entrepreneurs and their employees. They know the dangers and hazards related to their operations better than anyone. They or their families or co-workers have probably been injured or lived through a number of close calls. They also possess a wealth of information on how to improve environmental health and safety standards. As pointed out by Stratz (1996, 10), workers in the informal sector “recognise the often serious health and safety problems and, in some cases, general principles of occupational health and safety do exist across the various production sectors. “

Involving beneficiaries is an opportunity to allow them to gain greater control over the environmental health and safety concerns that affect their lives and the success of their enterprises. The understanding that is taught to and developed with beneficiaries will serve them well in the often unstable world of the informal sector and increasingly changing rural setting. Involving beneficiaries will help to ensure that the style and format of checklists and educational materials, such as posters and pictures indicating dangerous situations, are effective. Beneficiaries should be encouraged to present their own ideas about every topic including complex issues such as toxic substances.

As the WISE example demonstrates, there are ways to involve beneficiaries in health and safety programmes. Yet, despite what seems to be a reasonable course of action, many micro-entrepreneurs may not be interested in environmental health and safety. The problems of poverty and malnutrition, which contribute to poor working conditions, remain greater priorities for micro-entrepreneurs. The attitude may be, “why should I worry about what may kill me in 10 years when malnutrition will get me sooner?”

MFIs can counter this attitude by constantly stressing the many economic benefits of environmental health and safety. Also, packaging other topics with health and safety issues in training programmes is a good idea. This could include business-related subjects or social

concerns such as alcohol abuse or child safety. More aggressive means could be employed such as tying the approval of loans to the purchase and use of safety equipment or participation in training programmes. However, this does not provide any guarantees that micro-entrepreneurs will follow up on required measures. Finding ways to be successful in this area will require work. As Ayree (1996, 19) suggests, the diversity of the informal sector makes it necessary for occupational health and safety programmes to be gender and activity specific. Even “educated” workers in industrial countries will ignore safety regulations or not use safety equipment properly.

4.9 Partner Organisations Revisited

A number of organisations have a large stake in improving micro-enterprise environmental health and safety, none more so than municipal governments and agricultural departments in rural areas. Health departments in both rural and urban areas are sensitive to these problems as well. It would be a significant achievement if MFIs could play a role in overcoming the mistrust in this area between local governments and the informal sector. Some countries, such as India and Thailand, have government departments that have been very active in the area of worker health and safety standards at the small-scale enterprise level. Health departments and local clinics, despite their lack of resources, could assist greatly, at low cost, in promoting prevention activities (Ayree 1996).

In addition to local governments, international and local NGOs are concerned with health and safety practices. Bilateral donors including Canada, Finland and Denmark are becoming increasingly involved in the issue. The ILO and the World Health Organisation (WHO) have acquired a great deal of experience in this area.

4.10 Technological Change

Clean or cleaner technologies can reduce health and safety risks. Substituting non-chemical methods and processes for those which are chemical-based and restricting the use of chemical and pesticides are other useful technical or managerial “fixes”. The examples described in Box 4.4 demonstrate that, with some creativity and a small amount of resources, it is possible to resolve hazardous situations.

In rural areas, excellent technical fix options include chemical-free farming methods such as the development and use of organic fertilisers and the identification and use of local plants and insects with natural pesticide qualities.

An international scientific panel of 68 experts from 23 countries recently concluded that alternatives to methyl bromide are either currently available or at an advanced stage of development for more than 90 per cent of methyl bromide use (PAN 1996). Many of these are non-chemical approaches that are already used by innovative farmers and pest control companies (PAN 1996). For example, crop rotation and inter-cropping methods such as agroforestry can be used to reduce pest damage and hence the need for pesticides.

As Anderson (1994, 27) points out:

research has produced -- and is continuing to produce-- new pesticides that can reduce health risks and lower the stress on the environment. Specifically, pesticides are being developed that target particular pests. Pesticides are available that have shorter lives; their toxicity declines quickly, which reduces accumulation in the food chain and the environment. Another option for reducing pesticide use is Integrated Pest Management (IPM). IPM involves introducing natural predators into an area and relying less on chemicals to control pests. The technique has proven effective and is promoted widely

4.11 Information Support

MFIs can benefit from a worldwide interest in occupational health and safety and chemical research. There is an enormous amount of information, and a large number of institutional sources of information, available to MFIs. Not all of this information is directly relevant to the concerns of MFIs and some of it will be too technical. There is, nevertheless, a great deal of information that will be of general use. Below are a number of potentially worthwhile sources of information:

1. The United Nation Environment Programme (UNEP)

UNEP has produced the International Cleaner Production Information Clearinghouse (ICPIC-DV) on diskette. The ICPIC-DV is designed to help implement cleaner production by providing examples of technical applications, abstracts of available publications, lists of expert institutions and information on sources available from UNEP's Industry and Environment group.

2. *Canada's Workplace Hazardous Materials Information Systems (WHMIS)*

WHMIS came into operation in 1988. It is one of the first comprehensive health and safety information systems specifically designed for the workplace from the beginning. User oriented, its aim is to take into account both acute and long term adverse effects of hazardous materials and provide comprehensive precautions labelling and product data appropriate to the specific hazards which might affect human beings and the environment.

3. *ILO Information Services*

Both the International Labour Organization and its permanent secretariat, the International Labour Office, are excellent sources for information on an array of occupational health and safety issues. This includes information on classification, systems, labelling, and marking, chemical safety data sheets, design and installation, control, measures, work systems, personal protection, information and training, medical surveillance, emergency procedures, monitoring and reporting, and confidentiality. The ILO promotes a code of practice that provides guidance for the implementation of the Chemicals Convention 1990 (No 170), accessible via the Internet (ILO 1997).

4. *PACE, a WHO Initiative*

PACE, which stands for "Prevention and Control and Exchange," is a World Health Organisation sponsored programme designed to stimulate the sharing of solutions and control measures in order to reduce occupational hazards. Internationally, there is wide agreement on the need for sharing of occupational health and safety knowledge and a realisation that a collaborative effort is required.

5. *Canadian Centre for Occupational Health and Safety (CCOHS)*

The CCOHS has a large holding of publications, databases and materials on worker health and safety. Of special interest is a collection of CD-ROMS and the Centre's online services. These services have been used in more than 50 countries. OCINFOLine provides access to CCOHS' chemical and occupational health and safety databases. The CD-ROMS cover, among other subjects, current information on more than 1,200 important workplace chemicals, and practical guidance on topics such as handling and storage of hazardous products, personal protective equipment, and first aid.

Occupational health and safety standards is an area ripe for making effective use of information technologies such as electronic mail and the Internet. A growing network of occupational health and safety related information services can be found on the internet. In fact, the CCOHS offers courses on how to gain access to health and safety information via the Internet. Such Internet resources are expected to become more abundant and accessible (Uusitalo 1995).

Chapter Five Environmental Guidelines for Micro-Enterprises

5.0 Introduction

Given the enormous variety in micro-enterprise activity, it is impossible to provide environmental guidelines for every endeavour. This chapter presents environmental guidelines for food processing, aquaculture, poultry and livestock, urban-based micro-enterprises, and general environmental health and safety guidelines applicable to a wide range of micro-enterprises. These guidelines are intended to provide precise direction on the subjects covered as well as a general sense of what all environmental guidelines should focus on. In addition, the chapter provides ideas on how MFIs can prepare their own environmental guidelines. We begin by looking at environmental guidelines at the programming level.

5.1 Environmental Guidelines at the Programming level

MFIs have the potential to influence the environmental impact of their lending activities both at the project and programming level. Successful environmental management at the programming level is based on making effective use of information regarding local environmental, social and economic conditions and the insight generated from the experiences of specific micro-enterprises. Local information regarding resource depletion, occupational health and safety matters, air and water pollution, infrastructure problems and population density can help establish a general planning framework. The objectives for MFIs at the programming level are the following:

- 1) To understand and control the aggregate environmental impact of different types of micro-enterprise.
- 2) To better understand and control the collective environmental impact a group of micro-enterprises can have on a locality.
- 3) To develop effective mechanisms for providing micro-entrepreneurs with useful information and general guidance on how to improve the environmental performance of their enterprises.

The following are general ideas to guide MFIs in pursuing these objectives:

- v There are natural environmental limits to how much economic activity, or types of economic activity that a locality can support. Local water sources may be sufficient to absorb the wastewater of two micro textile operations but not five. Understand resource factors such as the availability of land and forest resources, water and sanitation services, quality of infrastructure, living density and space and the limits they place on economic activity.
- v In order to avoid the overuse of a resource or an unacceptable level of pollution in a locality, promote a mixture, and, if possible, complementary micro-enterprise activities that require different types of resources and/or can reuse each others' waste.
- v In rural areas, where the collective environmental impact of micro-enterprises is significant, regenerative activities such as reforestation can be promoted to refurbish a resource.
- v Encourage activity that is better suited to the resource base.
- v At the sector level, work with micro-entrepreneurs and their associations to ensure that environmental health and safety standards are respected and more environmentally-benign technologies and production processes are promoted. As more is learned about environmentally-sound procedures, promote their use and implementation on a collective basis. A simple idea--such as promoting a vegetable- or flower-based colouring dye, instead of a chemical one, amongst artisans--can have a very positive impact.
- v To the greatest extent possible, anticipate dilemmas that may arise from promoting certain types of economic activity. This may include conflict over land use, overcrowding, or other unforeseen occurrences. For example, a successful livestock initiative can lead to the creation of secondary industries such as tanneries and meat processing operations that are far more polluting than the original enterprise and can accelerate environmental problems.
- v In rural areas, ensure that MFI lending activities are not contributing to any unacceptable environmental impacts from activities such as the clearing of primary forests, wetlands or critical wildlife habitat, or the unsustainable intensification of agriculture.
- v Collaborate with local land, housing, health and public services authorities to improve services and standards in support of micro-enterprise activity.

5.2 Food Processing

Small-scale food processing activities employ a wide variety of processes and technologies to support a diverse array of micro-enterprise activity. The environmental impacts can be many. The major concerns in this sector are air, water and noise pollution and the possibility that food

processing may contribute to the unsustainable use of local resources such as farmland and forests.

Food processing activities such as corn milling can involve discharging wastewater, which may contain effluents, suspended and dissolved solids and other contaminants, into streams and rivers. If the water source is not large enough to absorb the discharge, the wastewater can be a pollutant. Cases where the wastewater cannot be discharged into nearby waters usually lead to the formation of stagnant pools of water. Such idle waters can be highly odorous while serving as breeding grounds for mosquitoes.

Dust particles produced through many micro food processing activities can lead to breathing problems. Equally worrisome are the high noise and vibration levels of food processing machinery. In addition, there are often many safety problems related to the electric driven equipment used in many food processing procedures. The risks come from exposed wires, motors overheating, and poorly-maintained equipment.

Raw materials used in micro food processing operations may be obtained through agricultural activity such as the conversion of forest land to agriculture or pesticide-intensive agriculture. Other food processing operations such as baking kilns can make intensive use of fuelwood. Such activities contribute to a rapid decrease in natural resources which, in turn, may lead to any number of social impacts such as the displacement of people. The following measures should provide guidance in minimising environmental impacts of food processing activities generally:

Guidelines

- ▼ Understand the role of the micro-enterprise in the local economy and its importance to the community as a creator of employment.
- ▼ Address any concerns community members have regarding the micro-enterprise.
- ▼ Ensure that drinking water sources or other productive uses of local services and resources are not compromised by the introduction of the food processing activity.
- ▼ To the greatest extent possible, use more efficient technologies and processes. Use preventive measures such as the reuse of wastewater. Explore the possibility of using more benign energy sources such as wind and solar energy.
- ▼ In cases where wastewater cannot be eliminated, ensure that water sources are able to absorb effluent discharges.
- ▼ Management plans should be in place for raw materials (e.g., wood, potable water, and fuel) and adequate storage facilities. In cases where the micro food processing operation will make intensive use of a local resource such as a plant, a forest or farmland, a regenerative activity such as a reforestation project should be considered.
- ▼ Ensure that live parts of motors are not exposed, electrical switchboards and panels are properly, wired, maintained and grounded, and regulate the heat of machinery.

- ▼ Although a use for most waste residue in food processing activity is usually found at the micro-enterprise level, there may be exceptions. Avoid burning waste as this contributes to air pollution. Ensure that any waste residue is used in some other productive activity such as making compost or providing feed to poultry or other animals.
- ▼ Site the operation to minimise the impacts of noise, odours, and pollutants.
- ▼ Design work space to improve efficiency and reduce risks.
- ▼ Do not locate the operation where it threatens wildlife, green space or sensitive eco-systems.
- ▼ Ensure that stagnant waters do not build up around the food processing operation.
- ▼ Ensure that micro-entrepreneurs and workers are aware of health and safety risks. Establish a workplace safety strategy with micro-entrepreneurs and workers. Promote the use of masks, gloves, and ear plugs and ensure proper ventilation.
- ▼ Site the operation for easy access to local health facilities.

Sources: Sobotie 1995; World Bank 1991b.

5.3 Aquaculture

In developing countries, the need to create employment and increase food sources for a growing population have made aquaculture an attractive option. “Fish farming”, “fish culture” and “aquaculture”, inter-changeable terms, describe the practice of raising fish and shellfish in fresh, brackish or salt waters to be harvested for human consumption or sale.

In part because of a lack of proper aquaculture knowledge and techniques, this increase in aquaculture activity often involves practices harmful to the environment. What historically has been an environmentally benign endeavour with great potential to put household and human and animal waste to good use while providing a good source of food, is increasingly an environmentally troubled sector of micro-enterprise activity. The main environmental concerns are water pollution, improper disposal of waste matter such as blood and offal, the conversion of valuable wetlands such as mangroves over to fish farms, poor construction practices allowing escape of water that leads to soil erosion and damage through salinization, impacts on the wild gene pool, and the pollution of local water supplies. Increasingly, extremely toxic chemicals such as aldrin and dieldrin are being employed as poisons to ward off predators and competitor fish. The impact of chemical use can lead to the elimination of other species in the ecosystem. These poisons are also a direct threat to public health as they easily enter into the food chain.

Aquaculture ponds are used to serve other purposes such as bathing and clothes washing. This lowers pond water quality by altering pH and increasing phosphorous concentrations, and exposure to the high levels of fertilisers, poisons and lime can pose certain health risks to humans.

As the field of aquaculture continues to grow, new practices are being introduced, often in new settings with little understanding of the long-term environmental consequences of those practices. Fortunately, however, most of the adverse environmental impacts of present aquaculture micro-enterprises can be avoided:

Guidelines

- ▼ Gather information on present aquaculture activities in the area where the proposed aquaculture project will be implemented. The experiences and successes of active aquaculture projects in managing environmental problems will provide great practical guidance
- ▼ Develop a fish farming management plan with micro-entrepreneurs that takes into consideration such environmental factors as the appropriate fish stock to raise, ideal location, and the safe level of production given the size and character of the fish pond. Collaborate with micro-entrepreneurs to ensure the management plan is feasible and will be implemented.
- ▼ Resolve all conflicts related to common property resource ownership that characterise many aquaculture operations and may jeopardise the operation.
- ▼ Maintain the highest construction standards possible.
- ▼ Use preventive management practices such as refiltering water, or limiting the impact of salt water effluent by diluting it in a large water bed.
- ▼ Where dikes are used, build them high and large enough to prevent intrusion of unwanted species. Ensure that no surface water enters the pond without passing through a meshed screen to block any unwanted species.
- ▼ Protect against soil erosion and stabilise plant life by integrating agriculture activity, such as planting vegetation on dykes, into aquaculture operations.
- ▼ Use minimal doses of poison or, only when predators are found in the pond. Never use poison as a preventive measure. Explore other, non-toxic, alternatives such as lime.
- ▼ If fertilisers are used to prepare the pond for stocking, employ an appropriate mixture of organic and inorganic fertilisers.
- ▼ Explain health and safety risk to users and take preventive steps to avoid illness and injuries. Provide training on the safe use of fertiliser and pesticides.
- ▼ Work with entrepreneurs to limit non-aquaculture activities in ponds.

Sources: Asian Development Bank 1991; Chicoine 1996;
UNEP 1990; World Bank 1991b.

5.4 Urban Micro-enterprises *Non-Manufacturing*

Although pollution is not a worry, urban based micro-enterprises involved in non-manufacturing activities can have an impact on the environment. The main impact of this sector is encouragement of the slow decay of the urban landscape. Roadside restaurants, kiosks and small shops contribute to congestion, high noise levels, impede the circulation of traffic especially for pedestrians, encroach on green space or other spaces with aesthetic and functional appeal, can cause accidents and pose other health and safety risks. They also can contribute to the accelerated erosion of local infrastructure and services such as roads, and water and sanitation facilities. Such micro-enterprises may also be high and inefficient users of energy. To the extent that MFIs can influence matters, the following guidelines will be helpful:

Guidelines

The choice of location should be the one for which the fewest adverse environmental impacts are anticipated, taking into account current land-use, adjacent uses and inherited problems. In choosing a site ensure that:

- v Water and sanitation services are adequate to absorb the micro-enterprise and the micro-enterprise is located close to health facilities.
- v The micro-enterprise is not located close to tanneries, electroplating operations or other highly polluting micro-enterprises.
- v The enterprise is not contributing to congestion, displacement of people, obstruction of sidewalks or other pathways, or road traffic.
- v The enterprise does not create any other safety hazards.

The micro-enterprise should be located on land that:

- v Is a sufficient distance from sensitive land-uses such as housing and agriculture.
- v Is unsuited or poorly-suited for housing or agriculture, or is of little aesthetic or cultural importance, or is not valued as green space.
- v Take steps to ensure that the most efficient and non-polluting sources of energy are used. Given improvements in technology and price, explore with micro-entrepreneurs on both an individual and collective basis the possibility of using renewable energy sources such as wind and solar energy or more benign sources of conventional energy such as propane and natural gas.
- v Ensure minimal construction and operational impact of the facilities on the environment.
- v Consult the local population regarding any disagreements there may be regarding the siting, or activities, of the new micro-enterprise.

Manufacturing

The guidelines for non-manufacturing micro-enterprise are also applicable to micro-enterprises involved in production. In addition, consider the following:

- ▼ Locate the micro-enterprise as close as possible to waste treatment facilities. Although facilities to accommodate the hazardous waste of micro-enterprise are not widespread in developing countries, some do exist.
- ▼ Follow the workplace safety guidelines presented in section 5.6 of this text or any other measures deemed necessary.
- ▼ Determine how the workplace can be rearranged to eliminate resource and energy inefficiencies.
- ▼ Explore all available avenues to recycle waste.
- ▼ Use non-polluting raw materials such as natural dyes or other organic raw materials.
- ▼ Use low-emission production methods.
- ▼ In case of highly pollutant activities consider whether an alternative processes can be used to meet the productive demand.
- ▼ Site the operation as close to health facilities as possible.
- ▼ Take into account the activities of other micro-enterprises in the vicinity. Will locating the micro-enterprise in the selected spot further aggravate environmental problems to an unbearable point? Will the presence of the new micro-enterprise disrupt the existing cohesion amongst established enterprises?

Sources: Director General for Development 1991; German Federal Ministry for Economic Cooperation and Development 1995; Knausenberger, et al. 1996.

5.5 Livestock and Poultry

Livestock and poultry activity is the best example of why one should be concerned about the collective impact of a large number of small projects. Yet, there remain many ways to minimise the environmental impact of individual livestock and poultry projects. Poorly managed poultry and livestock can contribute to soil erosion, the destruction of vegetation, and the destruction of forest by stripping trees of bark and destroying tree seedlings. Rice fields and other crops can be destroyed by stray livestock. Drinking water sources can be contaminated by loose animals. In general, animal dung can be both a nuisance and a health hazard. Intensive livestock production that relies on pesticides and antibiotics carries health risks to workers and, as the pesticides and antibiotics enter the food chain, to local wildlife and human populations.

Guidelines

- ▼ Understand the role of poultry and livestock in the community. Determine why these species are valued. Gather information on their feeding preferences and grazing habits and watering habits.
- ▼ Ensure an adequate food and water supply exists.
- ▼ Consider developing new water sources to take pressure off existing ones. Ensure that this does not have its own environmental impacts such as altering grazing habits.
- ▼ Use simple measures to protect water sources and, if necessary, encourage the planting of local species of forage crops preferred by the animals.
- ▼ Ensure that animal grazing does not interfere with or destroy other productive activities such as gardens or crops.
- ▼ Biological diversity in an agricultural system means a healthy system for the environment and animals alike. Promote the raising of a mixture of livestock types. Variations in livestock eating habits and food preferences can reduce the pressure on local vegetation. At the same time, diversify the plant base to provide a more varied grazing selection to all animals.
- ▼ Rotate grazing locations as a means to prevent overgrazing and disease buildup.
- ▼ Do not introduce new forms of livestock into an area without being certain the local environment can support it.
- ▼ Avoid livestock raising techniques that involve the heavy use of insecticides and antibiotics.
- ▼ Consider improving the productivity of grazing lands by using waste products from other agricultural activities as fertiliser and compost.
- ▼ Understand how animal dung is used traditionally. Can health problems in the area be traced to these practices? Will alternative methods create health problems or aid in eliminating health problems? Are these new methods culturally acceptable?
- ▼ Trees can be intercropped with other crops such as grains and can be selected for their yield of food and non-food products, such as fruit, nuts, fibres, animal forage and fuel. Animals can harvest the food directly from the trees or the tree clippings, and fruit can be brought to animals in adjacent pastures or lots.
- ▼ Plan for seasonal variance in the availability of water and food sources.
- ▼ Provide information to beneficiaries on the nutrient requirements of individual animals.
- ▼ Determine with loan beneficiaries how much time they are willing to commit to these livestock management activities and plan accordingly.

Sources: Director General for Development 1991; Knausenberger 1996; Volunteers in Technical Assistance 1986; World Bank 1991b.

5.6 General Environmental Health and Safety Guidelines

The following are environmental health and safety guidelines that can be followed, to varying extent, by a wide variety of micro-enterprises. As noted in the previous chapter, all environmental health and safety guidelines should be developed with the direct input of micro-entrepreneurs and their employees.

- ▼ Assess any health and safety risks to workers as a result of dust, fumes, odours, or pollutants.
- ▼ Rearrange work space to reduce risks and facilitate order and cleanliness and improve efficiency.
- ▼ Impress upon everyone the importance of keeping a work area clean, remove all rubbish from the work space and situate receptacles for waste and debris in convenient locations.
- ▼ Ensure proper ventilation of indoor operations.
- ▼ Ban smoking and drinking.
- ▼ Reduce length of work periods to eliminate accidents caused by fatigue and health risks and annoyances caused by excessive noise and vibration of machinery; provide for rest breaks.
- ▼ Install proper lighting.
- ▼ Wash thoroughly after handling injurious or poisonous substances and wash before eating, drinking, smoking or using the toilet.
- ▼ Never use gasoline for cleaning purposes.
- ▼ Designate locations for handling and storage of effluents and waste materials.
- ▼ Set aside special areas for storage of raw materials, finished products, tools and accessories.
- ▼ Use pans and screens to prevent deposits of oil, liquid wastes or water on the surrounding floors.
- ▼ Many injuries are caused by differences in the physical makeup of workers. Account for people of different heights, strengths, and ability to handle mental stress
- ▼ Ensure the use of proper protective equipment especially when toxic substances are involved.
- ▼ Keep hazardous materials in plastic containers with tight fitting lids (preferably the original). If the product is in a rusting or metal or breakable container, the container should be placed within a larger plastic container with a tight fitting lid. Clearly label the outside container with the contents and date. This label should be in a language or use signs understandable to people in close proximity to the workplace.

- ▼ Store flammable products away from all sources of heat or ignition. Remember heat sources include electrical appliances, engines and motors.
- ▼ Store toxic substances out of the reach of children and animals. If possible, place them in a separate locked cabinet or other secure structure.
- ▼ In home-based enterprises and farming communities, keep toxic materials away from food supplies.
- ▼ Keep hazardous products away from wells, springs and other water sites.
- ▼ Never throw away, or bury, wastes in or around abandoned wells.
- ▼ To prepare for possible poisoning, keep clean water nearby and tell co-workers what sort of pesticide you are using and where the label is.
- ▼ If pesticides are inhaled, get workers to fresh air immediately.
- ▼ Avoid using newspapers and other flammable material for packing.

Sources: ILO 1994a; ILO 1996; ILO 1997; Kogi, Phoon and Thurman 1989; Matchaba-Hove 1996; Ontario Crafts Council 1980; Stratz 1996.

5.7 Developing Environmental Guidelines and Analytical Tools

In many cases, it will be necessary and more constructive for MFIs to develop their own environmental guidelines. Such guidelines will better reflect local circumstances and the scale of micro-enterprises. We once again underline the necessity to work with micro-entrepreneurs and community members to ensure that all environmental guidelines and analytical tools are properly adapted to local circumstances. In some cases, generic guidelines can be developed and shared amongst MFIs. The involvement of micro-entrepreneurs will ensure generic guidelines are relevant. To be effective, environmental guidelines developed by MFIs should concentrate, to varying degrees, on the following issues:

- A: Project Setting
- B: Design and operation
- C: Key environmental impacts
- D: Resource and energy efficiency questions
- E: Relevant social and economic matters
- F: Relevant policy and legal issues

Environmental guidelines should not be complex. The information obtained through the guidelines and the assessment process is meant to complement other forms of information gathered. It is important not to collect extensive social, economic and environmental data through laborious methods. In addition to slowing down the process, the data that emerges may be flawed, useless and misleading. The guidelines presented in this chapter are too elaborate for the assessment of a single activity. They are meant to cover a variety of scenarios. In many cases, information gathered through other project activities will provide details that normally would be covered through use of environmental guidelines.

After guidelines are developed, it is important to ensure that information is being collected and analysed properly. The most obvious and easy approach to doing this is to extend information gathering and analytic techniques used in other facets of MFI programming to cover the environment. If, for whatever reasons, these techniques are deemed inadequate, try to develop simple yet reliable instruments for assembling and analysing environmentally-related information.

Recent experiences in data gathering at the community level have demonstrated that relevant information can be assembled effectively through such techniques as semi-structured interviews, which are systematic yet flexible. Matrices, checklists, questionnaires and simple charts and graphs can be used to organise and interpret information. These are simple and effective tools. As Table 5.1 demonstrates, a matrix is a very adaptable planning and analysis tool that can be designed to analyse and differentiate amongst a wide variety of variables related to a project's impact. In this example, two potential sites are compared for suitability for a food processing operation. Each point on the matrix is assigned a value from +2 to -2. The matrix could be modified to look at the financial feasibility of the project or other environmental criteria.

Appendix 1: Promoting Environmentally-Based Micro-Enterprises

This Sourcebook has attempted to provide readers with a better understanding of micro-enterprise environmental problems and solutions. This appendix presents a more assertive approach to solving environmental problems that involves turning environmental challenges into opportunities to diversify the economic base of the micro-enterprise sector. The necessary transformation of both urban and rural environments can be accelerated through more environmentally-centred small-scale enterprise activity. In this regard, the micro-enterprise sector can play a more active role in facilitating the reformulation of economic activity to better coexist with the natural environment. Such a transformation would, of necessity, take place in accordance with the circumstances in which micro-enterprises operate.

For many years, environmentally-based economic activity has been one of the few bright spots in the stagnating economies of the industrial world. The Canadian environmental industry, for example, has been growing at an annual rate of 10 per cent, well ahead of the rest of the economy (Pallen 1996a, 39). The environmentally-based economic growth in the micro-enterprise sector of the developing world must not be confused with the experiences of the environmental industries of countries such as Canada. Nevertheless, the developing world micro-enterprise development of greener markets will share some of the characteristics of western environmental industries. This includes the development of new markets and technologies, the provision of

Box A1.1 Orangi Squatter Settlement

Orangi is the largest squatter settlement in Karachi, Pakistan with more than 1 million inhabitants. In the early 1980s, the Orangi Pilot Project (OPP) was formed by Akhter Hameed Akhan, a retired schoolmaster, to make Orangi a better place to live. Chief among Orangi's problems were horrid sanitary conditions. When it became clear that local government authorities would not build the required sanitation, OPP began a process of reducing the cost and simplifying the design of standard sewer designs. Researchers began by looking at a number of different sewage designs before concluding that it was technically and economically feasible to promote underground sewers. As Perweem Rahman of OPP points out, existing technical standards were ignored in favour of making the technology to "suit the social situation".

Septic tanks were installed between the sewer and toilets to ensure that only liquids reached the pipes. Another innovation was a new design of a manhole, smaller, cheaper, and simpler than conventional designs. The manhole covers were made of concrete rather than metal to ensure that people would be unable to lift them to dump waste.

Working with local masons, householders were encouraged to work together to install the sewers at their own expense. Residents of lanes with an average 20 to 30 homes began approaching OPP for help. Managers were appointed by each lane to collect money and organise labour and materials.

Despite assurance from "experts" that the approach was unsound, over the last 15 years, citizens encouraged by OPP have built 94,000 latrines connected to 5,000 underground lane sewers and 400 secondary drains that carry wastewater to local rivers. The OPP programme has been expanded to promoting improved housing designs and health and education activities.

Source: Pearce 96.

environmental goods and services, the promotion of the refinement of existing production

processes and techniques, and development and use of new and more efficient energy sources and energy efficiency materials and techniques.

A special challenge and opportunity exists in linking the greening of the micro-enterprise sector to meeting other development objectives such as improved health services, housing, access to basic water and sanitation services and affordable modes of transportation and energy. Diminishing government and donor resources and a growing population mean that an increasing number of people are without such basic services and infrastructure. Micro-entrepreneurs can play a role in meeting this demand. The potential for success of the ideas presented in this appendix can be tested against standard business criteria and the methods proposed in Chapter Three. As substantiated by the case studies presented in Appendix 2, many of the ideas presented here have already demonstrated their potential.

A) Expanded Agricultural Activity

Over the last decade, donor groups have cut back support for agricultural activity. This has happened despite the fact that the vast majority of employment remains agriculturally- based and the fundamental problem of food security for the poorest people has never been resolved. Many MFIs have continued to provide lending for small-scale farming and there is both a desperate human need and economic imperative to more deeply explore the potential of agriculture-based, environmentally-related, micro-economic activity.

Despite the recent tendencies of donor groups, NGOs, researchers and farmers have been working in different parts of the world to develop a very important foundation of experience and knowledge in small-scale agriculture. A considerable amount of successful experimentation and innovation has occurred that has often been environmentally- related. It has been shown there remains an enormous potential in small-scale farming to create work, increase the food supply and address environmental problems simultaneously.

It is important to point out that much of this insight and experience has been developed in some

Box A1.2 Organised Recycling

Good examples of organised recycling, in the form of recycling cooperatives, can be found in Cairo and Ciudad Juarez, Mexico. Scavenger groups in these cities have been organised into cooperatives to improve both working conditions and environmental management. In both cases, formal arrangements have been developed with the inputs provided by external agents.

In another example of organised recycling, “Association Je Recycle”, an NGO in Morocco, collects waste paper weekly from more than 50 offices in the Rabat area and sells the paper to a manufacturing plant. The association uses the funds generated to run the programme, to outfit collectors, to distribute information on paper conservation, and for interest free microcredit for the purchase of collection carts.

Source: Jansen 1995, 6-7. \

of the world’s harshest environmental conditions. These difficult circumstances, according to

many, actually present enormous potential for small-scale farmers (Chambers and Conway 1992, 24):

Echoing the findings of ecological analogies degraded resources quite often present immense livelihood potential. Paradoxically, degradation has often protected resources for the poor, because land is degraded -deforested, eroded waterlogged, bare from grazing, flooded or unsustainably cropped - it has low value. But again and again, when management practices are changed, remarkable bio-economic potential is realised.

Chambers and Conway (1992, 24) add that despite certain “‘bio-economic’ limits, there is enormous scope for intensifying and complicating farming systems.” There is also great promise, as Anderson (1994, 2) suggests, in technology that can significantly improve the economic performance of small-scale farms. There are numerous examples of environmental enhancement of small-scale agriculture (see Borrini-Feyerbrand, Pye-Smith and Sandbrook 1994). A key element in the success of these new practices has been the focus on building on existing knowledge and practices of farmers and ensuring their active participation throughout the project cycle.

In addition to participating in environmentally-appropriate farming techniques, micro-enterprises can be involved in promoting such practices and agricultural supplies such as drought resistant seeds and more versatile plants, plants and flowers that produce natural dyes and colours, appropriate farm implements, organic fertiliser and other farming services. Non-farming activities can also be encouraged. As Chambers and Conway (1992, 2) point out, already “high proportions of incomes of the poor, even of those with land, derive from sources other than direct farming.”

Box A1.3 Salvation from Sewage in Calcutta Marshes

Over the past century, Calcutta has developed a system of sewage disposal that is among the most efficient and ecologically benign in existence. Approximately one-third of the city’s sewage is transformed by East Calcutta Marshes into a daily harvest of 20 tonnes of fish and 150 tonnes of vegetables. This natural sewage treatment system, which purifies sewage and industrial wastewater, supports 40 species of fish. The self-help system has been copied outside of Calcutta and more than 20,000 “non-expert” people have been involved in the creation of the system.

The success of these natural sewage disposal systems has brought the support of government officials in the form of assistance to sewage treatment cooperatives. The 430 members of one of these groups, the Mudiary Co-operative, harvest more than a tonne of fish a day from ponds in the heart of Calcutta's dockland.

Source: Pye-Smith 95, 20-22

B) Urban Agriculture

Depending on location, urban agriculture may be an option. Urban agriculture is already practised throughout Africa, Asia and Latin America. Urban agriculture encompasses:

Formal cultivation and many more things including: fruit growing, container gardening, use of marginal areas such as road reserves, basements of abandoned buildings, boxes, canals, vacant land in towns, aquaculture (pond-fish farming), urban horticulture

(vegetable and fruit production in urban and peri-urban areas), floriculture (production of flowers and urban ornamental trees and small plants), backyard and frontyard gardening, micro livestock keeping, hydroponics, roof top gardening, biodegradable waste recycling, and more (Sawio 1993, 3).

As Chimbowu and Gumbo (1993, 7) point out, “urban agriculture provides an opportunity to create employment and help to transform the urban landscape into a more self reliant entity.” A close examination of most urban areas reveals public lands and water and organic waste that can be used for agricultural purposes. Community lands and households can also be put to use . Every urban centre has its own special conditions for facilitating urban agriculture (Smit and Nasr 1992). Minor technological advancements can enhance the potential of urban agriculture.

One successful example of urban micro-enterprise agriculture is a squatter slum in Bogota, Colombia whose residents used hydroponics to grow vegetables on rooftops. “This was achieved in containers placed on very light wooden structures in up to three layers. This is a highly productive activity directed primarily at supplying metropolitan supermarkets. The women farmers typically earn as much as their semi-skilled husbands (Smit and Nasr 1992, 150).

In order to promote urban agriculture, local bylaws covering the space where urban agriculture will be practised must be understood. Also, urban agriculture can present certain health risks that must be reduced (Smit and Nasr 1992).

C) Conservation Related Micro-enterprise Development

Environmental groups have been involved for more than a decade in the promotion of conservation-related micro-enterprises. They have sought to establish these micro-enterprises as an alternative to unsustainable economic activity that threatens the biodiversity and the unique and endangered species of ecosystems such as rainforests. Micro-enterprise development has become a key element in many of the conservation/development projects that have been implemented.

Environmentalists have met with some success in this sector. However, overall the experience has been disappointing. Much of the failure of environmentalists in the 1980s and early 1990s to establish viable businesses related to these factors (SEEP Network 1995, 3):

- ▼ An inadequate understanding of the socio-economic context -- livelihoods are more complex than [simply] jobs in their relationship to religion, seasonal cycles, cultural taboos, kinship networks, etc;
- ▼ A poor relationship between enterprise objectives and environment objectives;
- ▼ The significance of asking people to change how they allocate their labour;
- ▼ A poor distribution of benefits in otherwise successful efforts caused friction that threatened environmental objectives.

Richards also suggests environmentalists have embarked on ventures with too many new elements; new technologies, new products, new entrepreneurs and new markets. Microcredit specialists will recognise that many of the problems encountered by environmental groups relate to weak business and community development practices.

Despite the challenges, environmental groups have identified an area of great promise. Value added products, organic farming, eco-tourism, agroforestry, and non-timber forest products are among the numerous activities that have been promoted. In Indonesia, 6 million people earn a living by collecting or processing non-timber forest products for export revenues of US\$202 million per year (FAO 1991b).

Box A1.4 Gold Processing Retort

Mercury is widely used by small-scale miners in recovering gold from ore. Among other problems with this practice is the release of mercury vapour into the air.

To counter this problem, the Mining Programme of the British-based Intermediate Technology Development Group developed a simple closed vessel, known as a retort, which prevents the mercury vapour from escaping when the ore/mercury combination is heated. This retort is based on a design from Brazil and is relatively easy to make and use.

Source: Intermediate Technology Development Group 1994/95.

D) Renewable Energy

If current patterns continue, we are entering into an unprecedented period of creativity and innovation in small-scale energy systems. The change taking place in energy has been compared to the extraordinary explosion in computer technology (Flavin 1996). In future, new and renewable energy sources and systems such as hydrogen, wind, solar, and micro hydroelectricity will be cleaner, more efficient and adaptable, and increasingly cost-competitive with conventional energy sources.

Many of the technical problems that have held such sources back from having a wider application are rapidly being overcome. The commercial cost of, for example, solar-based electricity (photovoltaics or PV) has declined from more than US\$70 per kilowatt in the 1970s to US\$4 today (Flavin 1996). Given the other benefits of solar energy, this price is very competitive for small-scale economic activity. Competitive-minded American companies claim they can have the price down to US\$1 a watt within three years (Halpert 1996, D20). This would make PV competitive with more conventional sources of energy.

These affordable and efficient scaled-down energy sources will create enormous opportunities for all development practitioners. They are especially favourable to small-scale economic activity. Micro-enterprises will be able to benefit from cleaner, competitively-priced energy sources. Micro-enterprises can also be created to service, install and build the equipment for these new energy sources and systems. Micro-enterprises, either on an individual or collective basis, will be able to exercise greater control over matters related to energy. As demonstrated by the successful rural electrification work of Enersol (see Appendix 2) and other NGOs such as Solar Electric Light Fund (SELF), many of these expectations are already being realised. The recent World Solar Summit in Harare, which identified small-scale applications in the developing world as a priority, should hasten further applications. MFIs should begin immediately to understand the potential of renewable energy and energy efficiency in the operations of the micro-enterprises they support.

E) Transportation

Only a slight minority of both urban and rural micro-entrepreneurs have access to motorised transportation. The majority will continue to remain dependent on relatively environmentally-benign forms of transportation such as walking, bicycles, carts and animals. Within this context, there is enormous opportunity for micro-enterprises to promote improved small-scale transportation systems.

Although not as advanced as the energy field, there is a growing recognition of the value of non-motorised transportation by development practitioners both from an environmental and practical standpoint. Non-motorised transportation can be improved to provide better access to markets and resources, increased mobility and to lessen the health risks related to excessive walking and carrying. The recycling sector in urban centres could be greatly reinforced by the addition of simple, practical transportation systems (Wass 1991). An activity such as fuelwood collection, which has become such a burden, could be rendered manageable again.

Improvements and innovation in bicycle and bicycle-related equipment commodities such as trailers is taking place throughout the world. A bicycle with a properly designed trailer has

enormous carrying capacity. The technologies involved are simple. Trailers, handcarts and bicycles could all be fabricated by micro-entrepreneurs to meet the needs of local markets. In Sri Lanka, Rural Enterprise Development Services (REDS) has been successfully promoting the use of trailers in small-scale business operations and for domestic use. The trailers are fabricated by micro-enterprises (Pallen 1997). In East Africa, handcarts are being built and sold by micro-entrepreneurs for similar purposes.

F) Water & Sanitation

In the developing world, the growing gap between the need for services and the ability to provide them is seen most prominently in the field of water and sanitation. New thinking is required on how water and sanitation services can be delivered in both urban and rural areas. The idea of providing every home with adequate water and sanitation will be impossible unless low-cost and simple, efficient technologies can be developed and widely promoted. Micro-entrepreneurs are well placed to provide such services. Etherington (1997) summarises some of the key opportunities in this sector:

Low-cost water supply systems require a range of goods and services including the construction of wells, the installation of hand pumps and their maintenance and repair. In many parts of the world, wells are still hand-dug by small-scale contractors, offering an alternative to boreholes drilled by mechanised rigs at a fraction of the cost.

If these contractors can obtain small amounts of credit, the efficiency and safety of well construction can be enhanced with the use of correct hand tools, moulds for constructing the concrete forms (caissons) to be dropped in the well, and dewatering pumps that allow construction to continue after water has been reached.

Once installed, hand pumps require both regular maintenance--usually done by trained users--and repairs to deal with more serious problems. [The repair] services are best provided by a trained mechanic residing within a reasonable distance [of] the pump and who is able to maintain a small inventory of spare parts.

Adequate amounts of clean water provide a productive resource for such products as vegetable gardens, food production and brewing.

Sanitation facilities require the services of small-scale masons, ideally able to build simple, appropriate latrines both in households and for community use. Public latrines are themselves a micro-enterprise with the user fees used to employ a caretaker to ensure their cleanliness.

The Orangi Pilot Project described in Box A1.1 demonstrates the potential of so-called marginal groups to address water and sanitation problems.

In some cases, providing water and sanitation services will not be feasible on an individual household level. Communal services or other arrangements should not be dismissed. Understanding community and cultural standards and learning from community members will help to understand the limits to and potential for developing new ways of delivering water and sanitation services.

G) A New Outlook on Recycling

The traditional wisdom of not tinkering with something that is already working is found in most cultures. In recycling, the micro/informal sector has a real success story that has occurred with little financial support and often despite opposition from local governments.

There is still a role, however, for MFIs to play in the periphery of the recycling industry to further develop the potential of this sector. Promoting use of equipment to maximise the retrieval of recycled goods, communal bins, simple transportation techniques, and other methods could enhance the profitability of recycling (Waas 1991). Also, many recycling activities can pose serious health risks (see Hunt 1996). MFI promotion of health and safety equipment such as gloves, masks, goggles, overcoats and earplugs could be very advantageous. The recycling projects described in Box A1.2 demonstrate the potential to improve working conditions and increase profit and environmental well-being through improvements in the organisation of recycling operations.

It is also possible that not all recycling opportunities are being explored. In fact, the sector's potential in regions such as Africa is considered to be underdeveloped. Each location presents its own possibilities. Micro-enterprises in the rapidly growing countries of Southeast Asia will have different opportunities than their African counterparts.

Recycling can be applied to the commodities and products available in the marketplace. This means that as developing countries continue to be flooded with new commercial products, new recycling opportunities are created. One new area that is of particular interest is electronics and computers. Throughout the world, electronic and computer parts are being discarded. These could be easily rehabilitated or stripped for valuable recovered metals including copper, gold, silver and those from the platinum group (Velduizen 1994). "The downside, in terms of adverse environmental effects from the recycling process, is remarkably small (Velduizen and Sippel 1994, 7)." It is estimated that, by the year 2005, more than 150 million computers, most of which will still be operational, will be dumped in garbage heaps throughout the world (McDonald 1995, 19).

H) Waste Treatment

Finding solutions to domestic and industrial wastewater is of grave importance to developing countries. Again, as in the case of water and sanitation, it is critical to find simple, cost-effective solutions. As proven by the Calcutta example in Box A1.3, such operations are within the

capacity of micro-entrepreneurs. The Calcutta example is very grandiose. It is certainly plausible that micro-entrepreneurs could promote less ambitious water and sanitation models. Micro-enterprises could be offering such waste treatment systems to polluting factories, residential areas and the commercial and institutional sector.

Waste can be treated and purified by the natural processes found in small lagoons. There is growing interest and proof in the soundness of sewage lagoon systems that treat the waste with a duckweed (*Lemna* spp.) cover. Species of duckweed are found worldwide and grow on nutrient-rich water such as sewage wastewater. Duckweed is a quick growing plant. In addition to treating waste, duckweed is considered to be an excellent food source for fish, poultry and cattle. Case Study 3 (see Appendix 2) provides more insight into the potential of duckweed and, in particular, the work of PRISM, a Bangladeshi NGO which, since 1989, has been operating a duckweed lagoon that treats domestic sewage.

I) Housing and Health

The need for affordable housing is well-documented. What is not as well appreciated is the need and potential to develop homes that can accommodate home-based enterprises. The structure, design and fabric used in construction for homes that double as a work site require special attention. Who, other than micro-entrepreneurs, are better placed to understand how to design and build homes to meet their needs? The development of multi-purpose housing is a good area for collaboration between housing groups and MFIs.

In the field of health care, there is some experience in promoting primary health care and family planning through micro-enterprise activity (Olson 1995). Significantly, in addition to their health potential, family planning services have enormous environmental benefits as well. Opportunities in this area are growing (Olson 1995).

Entrepreneurial approaches to service delivery in the health care field provide insight into how environmental products and services could be marketed to poorer groups. Such strategies have included (Olson 1995, 2):

- ▼ Stimulating consumer demand and the ability to pay for health services through increasingly responsive and flexible financial services, as well as education, marketing and income generation programmes to increase consumer awareness and purchasing power.
- ▼ Improving the supply of health care by increasing the efficiency and management of existing health care providers and creating new health-related enterprises.
- ▼ Creating or stimulating demand for health care services through micro-enterprise development of flexible financial services, social marketing and education.

The key to promoting health or environment services through micro-entrepreneurial activity is to treat people receiving those services as clients rather than beneficiaries (Otero and Rhyne 1994). Such an approach, for example, should be applied to micro-enterprise marketing of health and safety equipment to other micro-entrepreneurs.

J) Green Technology & Safety Equipment

Safety equipment and environmentally- benign technologies could also be manufactured by micro-entrepreneurs. Once micro-entrepreneurs begin to look closer at their operations and participate in the development of alternative techniques and technologies, they also may end up with a very marketable commodity. There are already many technologies that exist that are effective and low-cost such as the retort for small-scale mining described in Box A1.4. Network-building, as described earlier in section 3.12, can be used to identify markets for green technologies and safety equipment.

K) Advocating Legal & Municipal Bylaw Reform

Perhaps the most important contribution that MFIs can make to creating environmentally- based economic opportunities for micro-entrepreneurs is to lobby for reform of local and national policies, laws and city ordinances. Changes in housing, land tenure and accessibility to public lands would greatly enhance the potential of micro-entrepreneurs to undertake the activities suggested throughout this Sourcebook. MFIs have long recognised the problems created for micro-entrepreneurs by counter-productive policies and laws. The need to protect workers and their environment provides new motivation to push for reform.

Throughout the world, there is a new openness to see how bylaws and government policy can be reformed as part of innovative, often participatory solutions to problems related to decaying public infrastructure and services. An example related to micro-entrepreneurs, housing and the environment can be found in Lublin Poland. In 1990, a process was undertaken to revitalise the neighbourhoods of Lublin. Lublin's Urban Planning Unit launched a "participatory planning process" to involve community members in the rehabilitation of their neighbourhoods (Serageldin and Kipta 1996, 10). The city and local communities developed a plan for sharing the cost of projects to rehabilitate the local infrastructure in two pilot areas. A key achievement was to "formulate planning regulations to promote the development of micro-enterprise and home-based economic activities and expedite permitting procedures to stimulate housing renovation and expansion (Serageldin and Kipta 1996, 10)." Within two years, 137 houses were renovated and 50 new buildings constructed. 55 micro-enterprises were established in renovated buildings employing 120 people (Serageldin and Kipta 1996). This same process of collaboration is being used to plan environmentally related activity.

Appendix 2: Cases Studies of Environmentally-Based Micro-Enterprises

1) Solar Based Rural Electrification Concept (SO-BASEC)

Solar Based Rural Electrification Concept (SO-BASEC) was developed by Enersol Associates, a non-profit international development organisation working to improve the quality of rural life in developing countries by fostering the use of solar energy for rural electrification. The SO-BASEC model was developed in the Dominican Republic and has been expanded to Honduras. SO-BASEC seeks to provide a clean, dependable source of electricity to rural entrepreneurs and households not served by the main energy grid while creating opportunities for micro-entrepreneurs through the sale, installation and maintenance of small solar electric or photovoltaic (PV) systems.

SO-BASEC relies primarily upon the strength of local private institutions in both the commercial and the non-profit rural development sector. The two main components of the model are (1) technical assistance and training to establish a hardware delivery structure, and (2) access to credit to make the PV hardware available to a broader population.

The SO-BASEC training is provided during five-day technical workshops that emphasize hands-on installations. Enersol began these courses in 1986 and now offers a sequence of four training packages, each lasting five days and averaging 10 participants. The first level course introduces the technician to the solar business and deals with basic PV systems. Simple business strategies, such as how to obtain components and set a system price, are included. After applying the skills from the first level course, technicians qualify for the more technically advanced second level course. The second level course discusses advanced business practices. To offer peer support, SO-BASEC encourages the formation of a network of trained technicians providing services.

Enersol's SO-BASEC model relies on already-established local, non-profit NGOs to offer and manage related financing, either directly or through established credit association. The loans are issued to end users who repay the principal, plus interest, in a set number of monthly payments.

In the Dominican Republic, more than 4,000 systems have been installed, more than half of which by local technicians trained by Enersol. A network of 15 small installation enterprises have been established and five NGOs now operate PV credit programmes. Approximately 500 PV installations are made each year as a result of this self-sustaining capacity.

In Honduras, a network of small entrepreneurs, trained and assisted by Enersol, has installed 1,000 PV systems in rural homes and small businesses. The number of Honduran solar entrepreneurs has grown from zero in 1992 to more than 20 as of 1995. The number of systems installed during each year has grown exponentially with the growth in number of small PV businesses, jumping from 60 systems installed during 1993 to 300 during 1994 to 550 during the first half of 1995.

Source: Smith 1995.

2) Bioconversion Technology Among Rural Entrepreneurs:

Asia Institute of Technology

Nearly all phases of food and feed life cycles (e.g., production, collection, transport and storage, processing and preservation, as well as sales and consumption) generate residues in one form or another. Thus, there is an abundance of organic matter which can be used as raw material for conversion into useful products. The value added by reuse of agricultural and agro-industrial wastes or by-products not only offers opportunities for income generation in rural areas but also reduces the impacts of environmental pollution. Fully utilised, the bioconversion of organic residues or wastes can have environmental and economic benefits similar to those of cleaner production or waste minimisation programmes. Ideally, all, or almost all, wastes will be reused because they are seen as valuable input materials for other, value added products.

The Asia Institute of Technology's Southeast Asia Program Office (SEAPO) is collaborating with the German group CDG (Carl Duisberg Gessellschaft) in the promotion of small biotechnology-based businesses, especially mushroom and bio-organic fertiliser production. The CDG-SEAPO programme is based on the following context, goals and assumptions:

- ▼ The availability of an abundance of agricultural and agro-industrial waste materials. Seventy-five per cent of plant production output is non-used biomass, most of which can be reused instead of polluting the environment.
- ▼ Historic experience in the use of relatively simple, non capital-intensive microbial processes for the provision of goods and services, especially of food.
- ▼ The eventually high potential for improving existing biotechnologies through application of modern science and engineering principles.
- ▼ The need to complement biotechnology transfer from R&D centres to enterprises, farms, and potential entrepreneurs with relevant small entrepreneurship development training and other useful assistance strategies.
- ▼ Generate income and create employment and utilise abundantly available organic waste materials.

The project's main goal has been to support and create Viable Small Biotechnology Businesses (VSBBs) in rural regions of developing countries. This main goal has been based on the twin objectives of:

- 1) Enabling and strengthening Science and Technology institutions for adequate biotechnology transfer.
- 2) Successful commercialisation by Small Biotechnology Businesses (SBBs).

The mushroom-based enterprises produce food directly on a substrate of prepared organic waste materials. The Bio-Organic Fertiliser (BOF), if used for food and feed crops, also helps make organic wastes a contributor to food production. The project has resulted in different levels of economic activity both micro and medium, with varying degrees of success. More than 1,000 entrepreneurs have been trained. One noteworthy tiny BOF operation is PAYOGA, a local NGO in Northern Luzon, Philippines which started its BOF plant in summer 1992. From 100 tonnes of

rice straw and another 90 tonnes of manure, PAYOGA has produced 1,900 50 kg bags of BOF of which 1,600 bags were sold to nearby farmers.

Source: Tharun 1994.

3) Duckweed Aquaculture Project: PRISM Bangladesh

A group of tiny aquatic plants commonly known as “duckweeds” (*Lemna* spp.) are a promising commercial aquaculture crop. Species of duckweed are hardy and fast growing and have the same protein quality of soybean. They appear to be a complete nutritional package for such fish as carp and tilapia. In addition, duckweed-based wastewater treatment systems can provide effective and inexpensive solutions to wastewater problems for towns and villages with limited resources. Duckweed wastewater treatment systems, which are essentially lagoon systems, remove, by bio-accumulation, as much as 99 per cent of the nutrients and dissolved solids contained in wastewater. Duckweed systems distinguish themselves from other efficient wastewater treatment mechanisms in that they also produce a valuable, protein-rich biomass as a by-product while reducing the continual influx of harmful substances (nitrogen, phosphorous) into receiving bodies of water (rivers, lakes or seas).

In collaboration with the United Nations Capital Development Fund (UNCDF) and the Government of Bangladesh, the Bangladeshi NGO, PRISM, undertook a project to establish a viable and replicable integrated system of small-scale intensive fish-farming and duckweed production. The output from duckweed ponds was to serve the feeding needs of the fish ponds. The project’s duckweed production was based on the technology developed at the Mirzapur Centre, one of two extension services centres established by the project. The project targeted landless or marginal farmers in order to provide them with a new source of income.

Although a recent mid-term evaluation of the project indicates the project is not meeting all expectations, the duckweed technology remains one of the more positive aspects of the project. Although not an original objective of the project, the construction of improved “pour flash type” latrines, connected to the duckweed ponds to treat human waste, proved very popular with local families. Households were highly appreciative of non-tangible benefits of this technology, i.e., no smell, and reduced flies and mosquito populations due to the complete coverage of water surfaces by duckweed.

Within the project areas there was evidence of a high level of interest in duckweed technology, with individuals approaching project staff for information. Naturally-occurring duckweed, previously available free from non-project ponds, is now recognised as a resource, and a market in the supply and trade of fresh duckweed is developing. The failure of the duckweed production to provide all the feed necessary for the fish ponds as originally planned was attributed to poor project planning. An evaluation of the project concluded that duckweed had the potential to become a complete feeding source.

Sources: Sultana and Roy 1996; Skillicorn, Spira and Journey 1993.

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