

**AGENTS OF SEED DISPERSAL**  
*Animal – Zoochory / Wind – Anemochory*

by

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SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN VISUAL STUDIES  
AT THE  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SEPTEMBER 2004

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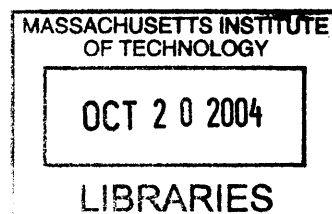
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# AGENTS OF SEED DISPERSAL

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Lukasz Kamil Lysakowski

Submitted to the Department of Architecture  
on August 6, 2004 in Partial Fulfillment of the  
Requirements for the degree of Master of Science in  
Visual Studies

## ABSTRACT.

### AGENTS OF SEED DISPERSAL:

Is a project designed to address the increase of environmental degradation, which occurs as a result of the perpetual spread of the asphalt and concrete of the contemporary urban situation. Agents of Seed Dispersal proposes that the city is a natural ecosystem within the greater context of earth's environment. The city as an ecosystem challenges the common notion that the urban setting is artificial and the environment outside of its boundaries is the sole representation of nature. The metropolis as an ecosystem requires that earth's occupants address it as a natural system and as an ecosystem it requires environmental thought and action. Through the Agents of Seed Dispersal project the author initiates two separate but corresponding projects, which focus on urban environmental degradation by reversing the spread of the asphalt surface and its corresponding suffocation of plant life by propagating the distribution and growth of specific plant life within the city.

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## AGENTS OF SEED DISPERSAL (Animal – Zoochory / Wind – Anemochory)

*Environmental change is a continual process that has been in operation since the earth first came into existence. Since then, dynamic systems of energy and material transfers have operated on a global scale to bring about gradual and sometimes catastrophic transformations of the atmosphere, hydrosphere, lithosphere and biosphere. For most of earth history the agents of change have been the natural elements of wind, ice, water, plants and animals; all of these have interacted to produce dynamic ecosystems that both control and are controlled by each other. However, a new agent of change emerged in the form of hominids that are considered by many to be the most powerful present generators of environmental change. As knowledge has progressed and science and technology have developed, human beings have achieved a greater insight into environmental change, and at the same time have developed the ability to alter the environment drastically. This is frequently inadvertent modification through agencies such as agricultural and industrial pollutants. Just as frequently, environmental change is brought about by direct and deliberate human activity such as deforestation and urban development.<sup>1</sup>*

(A.M. Mannion, Global Environmental Change)

<sup>1</sup> A. M. Mannion, Global Environmental Change: A natural and cultural environmental history (Essex: Longman Group, 1991) 2.

## 1. INTRODUCTION.

*Agents of Seed Dispersal*

is a project, which addresses the neglect and disregard of the environmental ecology within the built environment, an environment defined by the perpetual spread of the urban asphalt and concrete sprawl of our contemporary culture. *Agents of Seed Dispersal* is an action in which the author, but not limited to the author, becomes an agent of weed seed dispersal within the built environment in order to subvert and heal the urban ecology. A weed is a plant that grows where it is not wanted or a plant that is not deemed valuable by a specific culture. A characteristic that often defines a plant as a weed is that it is pernicious and persistent, tenaciously continuing and causing harm, but at the same time it is a plant that contains characteristics which are often beneficial but are overlooked or forgotten. At the same time a weed is often a plant that is brought into germination as a result of the human action of marking and disturbing the territory in which the seed was embedded. Human agency is often the propagator of the weed and as a result human action becomes one in which the human tries to undo the consequences its prior actions. Within the built environment the desire to fix and regulate prior actions is one of maintaining the impenetrable asphalt surface and propagating its spread into neighboring 'untamed' territories. Human agency is a reflection of human belief and as a result *Agents of Seed Dispersal* is the author's belief in the necessity of taking action in order to address the consequences of the neglect of and harm to the 'natural' world within the built environment. Through the *Agents of Seed Dispersal* project the author addresses the results by initiating two separate but corresponding projects, which reverse the spread of asphalt surface, and its corresponding suffocation of the plant life by propagating the spread and growth of specific plant life within the urban environment. The participation of the project is meant to be universal, any person can become an agent but for the purposes of this document the agent is solely a single individual, the author of the action and the document.

*Animal – Zoochory*

The first action is an intervention in the urban space of post-industrial asphalt lots in which the author, as the agent of intervention, bores through the asphalt surface in order to reach the underlying earth. The penetration is intended to allow the asphyxiated earth below the barren surface to be able to breathe, and simultaneously to be an opening in which wild plant life are able to take root. The revived plant life in return slowly mends the underlying stifled soil and over time deterritorializes the barren asphalt by reterritorializing into a space of (green) growth.

*Wind – Anemochory*

The second action is the deployment of aerial seed delivery technologies in order to traverse across and above walls, boundaries, and onto and into urban areas that are limited to public access and action by physical or authorized restrictions. The aerial delivery mechanism is built out of several modified items; helium filled

biodegradable trash bags which are modified with tape and safety pins in order to carry an attached porous mesh bag that releases seeds as the “balloon” system flies above the urban environment. The released seeds are scattered and distributed throughout the entire urban territory until they embed themselves into cracks and gaps in order to take root. Furthermore the system is used to deliver seeds of plants whose population has been severely reduced as a result of the transformation of their previous biological ecosystems into the modern-day urban ecosystem.





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I. DEFINITIONS.

A significant amount of environmental literature and discussion suffers from an ambiguity in regard to defining the key terms that characterize the various differing points of view. Environmental discussions that either agree with or disagree with the arguments that human activity results in environmental degradation equally experience the ambiguity within their arguments as a result of the lack of establishing concrete definitions of the key terms. The key terms such as Nature, Environment, Natural, and Artificial mean many things to many people. How one person understands and uses these terms often reflects their disposition towards the topic but at the sometime the same person fails to acknowledge or address that another person, a receiver, might have a different understanding of the same terms. In regard to the ambiguity this argument will define the key terms that will be used through out the paper in order to define the *Agents of Seed Dispersal* action.

*Nature:*

(The first two sentences are the key definitions, which define the view of nature for the A,S,D project.)

1. The material world and its phenomena.
2. The forces and processes that produce and control all the phenomena of the material world: the laws of nature.

(The next term is also a key understanding for nature but not limited to this understanding.)

3. The world of living things and the outdoors.

(The next two definitions do not define nature for the A,S,D project but are necessary to include as they present the differing views of the term, nature.)

4. A primitive state of existence, untouched and uninfluenced by civilization or artificiality.
5. Theology. Humankind's natural state as distinguished from the state of grace.<sup>2</sup>

(The third and fourth definitions limit the understanding of nature to simply being a territory of living organisms existing beyond the boundaries of the man made environment, nature becomes solely defined as a pristine unspoiled / unmarked environment. The fifth definition is truly contentious as it sets up an important distinction between humankind and nature, a distinction which places man as superior and possessing a prerogative from a higher power as found in humankind's state of grace to subjugate and exploit all aspects of the natural world.)

*Natural:*

1. Present in or produced by nature.
2. Of, relating to, or concerning nature: a natural environment.
3. Conforming to the usual or ordinary course of nature.
4. Biology. Not produced or changed artificially; not conditioned.<sup>3</sup>

Circa 1300, *naturel*, “of one’s inborn character, of the world of nature (especially as opposed to man)” from Old French *naturel*, from Latin *naturalis* “by birth, according to nature” from *natura* “nature.”<sup>4</sup>

(The term “natural” is a complex term since what is present and produced by nature is constantly changing, resulting in an evolving state of what is natural. What is defined as being natural at one point of time might not be considered natural in a different point of time because our understanding of what is natural changes as our environment and ourselves change.)

(The last definition, not produced or changed artificially, is a primary insight in the execution of the A,S,D project. The natural state of being, becomes one in which an element – environment, is one which has not been intentionally produced or marked by humankind as a direct result of the human agency of creating the transformation.)

*Artifact:*

1. An object made by a human being, for example, a tool or ornament, especially one that has archaeological or cultural interest.
2. Something in a biological specimen that is not present naturally but has been introduced or produced during a procedure.<sup>5</sup>

*Natural (Physical) World:*

In scientific terms, the material world (natural world) consists of all matter and energy. Such natural phenomena are the subject of scientific study, where the word “world” is often interchangeable with that of “universe.”<sup>6</sup>

*Environment:*

The totality of circumstances surrounding an organism or group of organisms, especially the combination of external physical conditions that affect and influence the growth, development, and survival of organisms (and vice versa the organisms altering of their surroundings).<sup>7</sup>

In non-technical contexts, such as politics, it often refers to the natural environment, that part of the natural world that is deemed valuable or important by human beings, for any reason.<sup>8</sup>

*Ecology:*

is the branch of science that studies the distribution and abundance of living or-

ganisms, their habitats, and the interactions between them and their environment — which includes both abiotic (non-living) elements like climate and geology, and biotic ones like other species. The term was coined in 1866 by the German biologist Ernst Haeckel from the Greek *oikos* meaning “house” and *logos* meaning “science.”<sup>9</sup>

*Environmentalism:*

Others may use the word ecology to mean not a science, but a philosophical or even religious system, which implies a specific vision of the universe and specific values and moral imperatives — e.g. that the totality of life is a coherent system, possibly with a purpose; that the extinction of higher species is “bad”; that people should live in harmony with other living beings; and that nature should be protected from human interference. Ecology in this sense is also called environmentalism.<sup>10</sup>

*Built (Urban) environment:*

Circa 1619 (but rare before 1830s), from Latin *urbanus* “of or pertaining to a city or city life,” as a noun, “city dweller,” from *urbs* (*urbis*) “city.”<sup>11</sup>

*Homeostasis:*

is the property of an open system to regulate its internal environment so as to maintain a stable condition, by means of multiple dynamic equilibrium adjustments controlled by interrelated regulation mechanisms. Multicellular organisms require a homeostatic internal environment, in order to live.

Homeostatic systems show several properties:

1. They are ultrastable;
2. Their whole organization, internal, structural, and functional, contributes to the maintenance of equilibrium
3. They are unpredictable (the resulting effect of a precise action often has the opposite effect to what was expected).<sup>12</sup>

<sup>2</sup> “Nature,” The American Heritage® Dictionary of the English Language, 4th ed. Houghton Mifflin Company. 2000, Dictionary.com. 01-June, 2004 <<http://dictionary.reference.com/search?q=nature>>.

<sup>3</sup> “Natural,” The American Heritage® Dictionary of the English Language, 4th ed. Houghton Mifflin Company. 2000, Dictionary.com. 01-June 2004 <<http://dictionary.reference.com/search?q=natural>>.

<sup>4</sup> Douglas Harper, “Nature,” November 2001, 16-July. 2004, Online Etymology Dictionary, 15-June 2004 <<http://www.etymonline.com/n1etym.htm>>.

<sup>5</sup> Microsoft Corporation, “Artifact,” 1999, Microsoft Word X for Mac, 15-June 2004.

<sup>6</sup> “Material World,” Wikipedia, 15 July 2004, Wikipedia the free encyclopedia, 14-June 2004 <[http://en.wikipedia.org/wiki/Material\\_world](http://en.wikipedia.org/wiki/Material_world)>.

<sup>7</sup> “Environment,” The American Heritage® Dictionary of the English Language, 4th ed. Houghton Mifflin Company. 2000, Dictionary.com. 01-June 2004 <<http://dictionary.reference.com/search?q=environment>>.

<sup>8</sup> “Environment,” Wikipedia, 12 July 2004, Wikipedia the free encyclopedia, 14-June 2004 <<http://en.wikipedia.org/wiki/environment>>.

<sup>9</sup> “Ecology,” Wikipedia, 15 July 2004, Wikipedia the free encyclopedia, 14-June 2004 <<http://en.wikipedia.org/wiki/ecology>>.

<sup>10</sup> “Ecology,” Wikipedia, 15 July 2004, Wikipedia the free encyclopedia, 14-June 2004 <<http://en.wikipedia.org/wiki/ecology>>.

<sup>11</sup> Douglas Harper, “Urban,” November 2001, 16-July. 2004, Online Etymology Dictionary, November 2004 <<http://www.etymonline.com/u1etym.htm>>.

<sup>12</sup> “Homeostasis,” Wikipedia, 09 July 2004, Wikipedia the free encyclopedia, 14-June 2004 <<http://en.wikipedia.org/wiki/ecology>>.





## 2. HUMAN AGENCY.

In order to explain the *Agents of Seed Dispersal* project it is necessary to begin the project description with a discussion regarding agency and how the phenomena is a crucial aspect of the human being. Furthermore, there is an important need to explain how the historical and cultural definition of human has informed the author's vector of actions. This chapter is not the author's manifesto about the human being instead it informs the reader about the opinions and beliefs which defined the author's reasoning and inspiration in the fulfillment of the action in regards to the human being and human agency. As this chapter is an introduction to the preliminary perceptions of the *Agent of Seed Dispersal* action and not an explanation, the author offers a short summary of information that informed the action. First, the key elements that define the human being is a high level of intelligence, the ability to manipulate forces of nature such as fire, and the crucial ability of self-reflection. The second critical element of this chapter is epistemology, the cultural definitions of the term human. The term human based on its epistemological roots defines the human as a being of the earth and originating and connected to the earth. The final element is the discussion of agency, the means in which a phenomenon is accomplished. The conclusion of this chapter and the reason of action is that the humankind as a being of the earth which has the critical ability to reflect upon it's own actions is directly responsible for the actions that negatively affect the earth and it's environment. Furthermore the human being through agency and self-reflection has the ability and responsibility to address the consequences of prior negative environmental actions.

*Biologists classify humans as a species (Homo sapiens) of primates and the only surviving species of the genus Homo. The species is commonly referred to as "mankind" or "humanity" and its members as "humans", "human beings" or "people". Man is a male human being and woman is a female human being. Historically, man may refer to all of humanity. There is only one extant subspecies or race, H. sapiens sapiens; that is, all humans alive today belong to this one subspecies.<sup>13</sup>*

"Human", "human being", "man kind", and "man" are expressions, which are frequently used, in the English language but often without a critical understanding of their history, definitions, and connotations. At the same time the manner in which we perceive ourselves as "humankind" changes resulting in a constantly evolving understanding, treatment, and utilization of the above mentioned terms. The comprehension and manipulation of the terms also differs based on the social – cultural values of the speaker and in return the receiver. The speaker and receiver cannot rely on a Holy Grail or single authority to set the final definition for the expressions in question because they are constantly redefined in order to serve the current necessities of their societal – historical age.

The expressions for *Homo sapiens* “human”, “human being”, “man”, and “mankind” originate from the terms “man” and “human”, in which both words essentially are defined as meaning “human being, person” but each one contains a subtle but different undertone.

The term “man” is often connected to the ‘root *men-* “to think”, which would make the ground sense of man “one who has intelligence”<sup>14</sup>

The term “human” is from “*humain* “of or belonging to man” from Latin *humanus*, probably related to *homo* (gen. *hominis*) “man” and to *humus* “earth” on notion of “earthly beings” as opposed to the gods (Hebrew. *adam* “man” from *adamah* “ground”)<sup>15</sup>

The term “human being” is traced back to a “Proto-Germanic, a hypothetical prehistoric language that is the ancestor of all Germanic languages, including English”<sup>16</sup>

The term “human” originates from the “middle French *humain*, circa 1250, which originates from the Classical Latin terms *humanus* which is probably related to *homo* (*hominis*) “man” and to *humus* “earth”<sup>17</sup>

It is difficult to concretely trace the verbal origins for the terms “man” and “human” which confuses the current application and understanding of these crucial terms. It seems that the two expressions might have had separate origins or might have shared the same origin, but their definitions and use changed as the terms became intermixed between ancient Latin and Germanic cultures. Since the initial use of the above mentioned expressions is unknown at the present moment both terms are often used uncritically in an unfastened understanding of their definitions. The primary significance that emerges from the prior meanings for the terms for “human” is of a being that is of the earth and possess intelligence.

Intelligence is not solely limited to human beings, many animals possess intelligence, but humans seem to possess an increased level of intelligence.<sup>18</sup> What exactly defines intelligence is often in dispute but largely it is agreed upon what makes humans intelligent is the ability to create tools (technology), to communicate with one another, play, and the ability to create a shared set of social beliefs and behaviors. It is not that other species do not possess these abilities but what seems to distinguish *Homo sapiens* from other species is the degree of facility to manipulate the above mentioned capabilities.



*Hephaestus and the Cyclopes forging the shield of Achilles*

One aspect that might distinguish humans from other species is the human ability to manipulate fire. No other species has the capacity to manipulate fire like *Homo sapiens*; with fire the human has been able to create agriculture by slash and burn, tools by the smith, and the ability to exist throughout different environments by means of the hearth. Fire for the ancient Greeks as found within their beliefs and myths was an essential element in the development and survival of the human race. According to the ancient Greek legend, the titan – god Prometheus molded the human being out of the earth and water but the human was not awarded any means of survival by Prometheus’s brother Epimetheus. Prometheus having compassion for the human race stole fire from Hephaistos and Athene and gave it to humankind in order to give humankind the ability to survive.<sup>19</sup> Through this stolen gift, humankind developed many different means to manipulate fire as each additional skill with fire gave humankind a new agency of survival and living.

Returning to the semantic understanding for humankind, a key description that emerges from the definitions of “human” and “man”, and also from the ancient Greek and Judaic / Christian creation myths is the connection of the human to the earth.

*“The term “human” is from ‘humain “of or belonging to man” from Latin humanus, probably related to homo (hominis) “man” and to humus “earth” on notion of “earthly beings” as opposed to the gods (Hebrew adam “man” from adamah “ground”).”<sup>20</sup>*

“Man” and “human” are used in the contemporary lexicon in a means that indicate their use as signifying *Homo Sapiens*. “Man” is not used through out this text because the term “man” often connotes the male species while negating the female species. But the word “man” is important in the discussion of the A,S,D project as “according to the Book of Genesis, Adam was the first man created by God.”<sup>21</sup> Furthermore in the Torah, Adam was used as the proper name of the first man.

The name Adam is “derived from the Hebrew word meaning ‘dust - to be red’ and thus the first man was called Adam because he was formed from the red earth.”<sup>22</sup>



*Adam and Eve and the lesser animals in the Garden of Eden.*

The second key word used to signify Homo sapien is “human.” The expression “human” is a combination of two vocabulary elements, “hu” - “hum” and “man.” “Hu” - “hum” is a shortening of “humus”, “(Latin, the earth, ground, soil.) The portion of the soil formed by the decomposition of animal or vegetable matter. It is a valuable constituent of soils.”<sup>23</sup> Humus is the top layer of soil, the black earth that is necessary to grow and support plant life and correspondingly all life on the planet Earth. The combination of the two elements “man - red clay” and “hu - top soil” indicates the significance of the earth to the human being. The human being as defined by both terms indicates that the human is of and from the earth. Humankind’s link to the earth as demonstrated by the word roots for “man” and “human” is both literal and symbolic, but they demonstrate the critical importance of the understanding of the human being as being a creature connected to the earth, the being of the human’s origin and sustenance.

Various present-day societies but especially the western Christian culture hold another but important belief that defines for them the meaning and role of the “human being.” It is a conviction that establishes humankind’s superiority over the physical world and all of its natural phenomena and life forms. It is a belief in which human beings define themselves superior as a result of their “god” given prerogative to command the resources of the Earth as they see fit. It is a right that is seen as being established from the Torah and the Bible, in which “God created man (Adam) in his own image” and “gave him (man) dominion over all the lower creatures.”<sup>24</sup> The belief sets up a human agency in which human beings deem themselves literally and symbolically superior to all elements of the natural environment. Furthermore, the belief of being situated above / beyond the environment setups the conviction that humans are not responsible for the environmental consequences which occur as a result of their agency.



*"Nature"*



At the same time the western Christian belief creates a notion in which "nature" is seen as a pristine territory unmarked by the hand of man. The natural world becomes defined as a pristine "green" territory outside - exterior of the artificial urban environment. Nature is seen as a virgin territory unspoiled by humankind and in need of preservation in its state of pure "wilderness." This conviction ignores the fact that all of the planet Earth has been marked by human agency as a result of intentional actions and by unintentional consequences of those actions.<sup>25</sup> The critical problem this belief forms is not the necessity to preserve so called "pristine" natural landscapes, but the belief that the urban environment is artificial and outside of the need of environmental thought. It is as if the built environment since it is artificial becomes an area, which can exist without environmental consideration. The urban environment becomes a zone in which humans believe they can manipulate the physical world in any manner they see fit without any consideration for their outcome. This belief system and other similar belief structures that foster and promote the artificial - natural distinction result in the devaluing of the physical world because they create the false idea that there is and always will be a state of "pure" wilderness beyond the boundaries of the built environment.



*Images from the Chernobyl disaster.*



The neglect and disregard of the environment is not solely limited to the western Christian culture because the atheist belief structure of the Soviet Union and Eastern Bloc did not prevent them from being a major source of pollution and resource misuse. The Soviet Union and the Eastern Bloc, which were governed by a centralized power structure, controlled by a select minority, which professed to govern in the name of its people, and the environment actually did the opposite. The Soviet Bloc nations instead of governing to benefit humankind governed to increase industrial production at all costs without regard to its environmental penalty. "Evidence has since indicated that during the post – World War II era, pollution and resource waste in the Soviet Union and the eastern Bloc were, if anything, a good deal worse than in Western Europe and the United States."<sup>26</sup>

Human agency, the human being's ability to define and choose their individual action, makes the subject of environmental degradation an issue distinctively one of and about the human being. The human being in the name of "progress" and "affluence" is actively changing the environment, and as a result *Agents of Seed Dispersal* is the author's agency to address the costs of "progress." Human beings are not

outside and beyond the physical world, instead we are organisms of the natural world, but the human being possesses or seems to possess a sense of “purpose and agency, self-consciousness and will.”<sup>27</sup> Human beings seem to be unique among earth born organisms as they have the ability to address themselves subjectively and objectively, and to some extent be “reflexive, rational, social beings, able to design ways of breaking the constraints of biological and physical laws.”<sup>28</sup> Human beings can not be responsible for all the environmental changes that occur, but as Kenan Malik states in his *In Defence of Human Agency* that once we free ourselves from our responsibilities and the side effects of our actions in the name of religion, fate, or nature we “unleash the monsters” which “make for both bad science and bad politics.”<sup>29</sup> The “monsters” as Malik states are the global environmental changes that are accelerated and fostered by human action. Global environmental changes such as “global warming”<sup>30</sup> and “ozone depletion”<sup>31</sup> occur are a result of hastily released sciences and blind politics. Natural forces have always been in the creation and destruction business, but as William Meyer states in the *Human Impact on the Earth* “humankind has emerged as a strong competitor.”<sup>32</sup> Furthermore Meyer states, “It (Humankind) is now, indeed, the principal agent modifying the earth’s surface. The human imprint on the earth’s landscape and processes – representing deliberate and inadvertent change alike – is profound and pervasive and becoming ever more so.”<sup>33</sup> As Meyer states, humankind has surpassed the nonhuman forces in the ability to transform earth, and if humans absolve themselves of the penalties of their actions as being one of nature or fate, then humans deliberately blindfold themselves and proceed down the path of irresponsibility and frivolity.



<sup>13</sup> “Human,” Wikipedia, 17 July 2004, Wikipedia the free encyclopedia, 14-June 2004 <<http://en.wikipedia.org/wiki/human>>.

<sup>14</sup> “Douglas Harper, “Man,” November 2001, 16-July. 2004, Online Etymology Dictionary, 15-June 2004 <<http://www.etymonline.com/m2etym.htm>>.

<sup>15</sup> Douglas Harper, “Human,” November 2001, 16-July. 2004, Online Etymology Dictionary, 15-June 2004 <<http://www.etymonline.com/h6etym.htm>>.

<sup>16</sup> Douglas Harper, “Proto-Germanic,” November 2001, 16-July. 2004, Online Etymology Dictionary, 15-June 2004 <<http://www.etymonline.com/>>.

<sup>17</sup> “Douglas Harper, “Human,” November 2001, 16-July. 2004, Online Etymology Dictionary, 15-June 2004 <<http://www.etymonline.com/h6etym.htm>>.

<sup>18</sup> Carl Sagan in *The Dragons of Eden* states; “Humans consider themselves the smartest organism in the animal kingdom. Humans have one of the highest brain to body mass ratios in the animal kingdom (Dolphins have the second highest; Sharks have the highest for a fish). While this is not an absolute measure, as a minimum brain-mass is necessary for certain “house-keeping” functions, it does give a good indication of relative intelligence.” (p.11). See “Human,” Wikipedia, 17 July 2004, 14-June 2004 <<http://en.wikipedia.org/wiki/human>>.

<sup>19</sup> Plato in *Protagoras* tales the story of Hephaistos and fire; “Having compassion for the race of men Prometheus stole the mechanical arts of Hephaistos (God of fire and smiths) and Athene (Goddess of wisdom and invention), and fire with them (they could neither have been acquired nor used without fire) and gave them to man. And in this way man was supplied with the means of life.” See Plato. (380 B.C.E). “Protagoras.” *MIT Internet Classics Archive* Trans. Benjamin Jowett. 380 B.C.E. MIT. 05-June, 2004 <<http://classics.mit.edu/Plato/protagoras.html>>.

<sup>20</sup> “Douglas Harper, “Human,” November 2001, 16-July. 2004, Online Etymology Dictionary, 15-June 2004 <<http://www.etymonline.com/h6etym.htm>>.

<sup>21</sup> “Adam and Eve,” Wikipedia, 11 July 2004, Wikipedia the free encyclopedia 14-June 2004 <<http://en.wikipedia.org/wiki/adam>>.

<sup>22</sup> “Adam,” Illustrated Bible Dictionary, 3rd ed. Thomas Nelson. 1897, Dictionary.com. 30-June 2004 <<http://dictionary.reference.com/search?q=adam>>.

<sup>23</sup> “Human,” Webster’s Revised Unabridged Dictionary. Webster’s Revised Unabridged Dictionary 1998. Dictionary.com. 15-June,2004 <<http://dictionary.reference.com/search?q=human>>.



<sup>24</sup> “God created man [Heb., Adam] in his own image, in the image of God created he him; male and female created he them.” According to this account, Adam was absolutely the first man whom God created. He was formed out of the dust of the earth (hence his name, which means “red earth”), and God breathed into his nostrils the breath of life, and gave him dominion over all the lower creatures (Gen. 1:26; 2:7).’ See “Adam and Eve,” Wikipedia, 11 July 2004, 14-June 2004 <<http://en.wikipedia.org/wiki/adam>>.

<sup>25</sup> “Even the most remote and thinly populated regions of the world are not remote enough to have remained unaffected. Haze from fossil-fuel combustion far to the south pollutes the Arctic sky. Both poles now receive heightened levels of ultraviolet radiation through a depleted stratospheric ozone layer. Arctic haze and ozone depletion, of course, though of humankind’s doing, are not all of its desiring. They represent purely unintended consequences of actions taken for other ends.” See A. M. Mannion, Global Environmental Change: A natural and cultural environmental history (Essex: Longman Group, 1991) 1.

<sup>26</sup> F. W. Carter & D. Turnock, eds. “Environmental Problems in Eastern Europe.” 1993. and D.J. Peterson, “Troubled Lands: The Legacy of Soviet Environmental Destruction.” 1993. In A. M. Mannion, Global Environmental Change: A natural and cultural environmental history (Essex: Longman Group, 1991) 47.

<sup>27</sup> Kenan Malik, “In defence of human agency,” 16-June 2002, [kenanmalik.com](http://www.kenanmalik.com) 15-June 2004 <[http://www.kenanmalik.com/papers/engelsberg\\_nature.html](http://www.kenanmalik.com/papers/engelsberg_nature.html)>.

<sup>28</sup> Ibid

<sup>29</sup> “It is when we stop thinking of ourselves as conscious agents, with the capacity rationally to change the world, and begin to believe that the answers to human problems lie beyond the human sphere, in God or in Nature, that we unleash the monsters. That is why the retreat from human exceptionalism makes for both bad science and bad politics.” See Kenan Malik, “In defence of human agency,” 16-June 2002, [kenanmalik.com](http://www.kenanmalik.com) 15-June 2004 <[http://www.kenanmalik.com/papers/engelsberg\\_nature2.html](http://www.kenanmalik.com/papers/engelsberg_nature2.html)>.

<sup>30</sup> Carbon dioxide, mostly from burning of coal, gasoline and other fossil fuels, traps heat that otherwise would radiate into space. Global temperatures increased by about 1 degree Fahrenheit (0.6 degrees Celsius) during the 20th century, and international panels of scientists sponsored by world governments have concluded that most of the warming probably was due to greenhouse gases.

Before the industrial age and extensive use of fossil fuels, the concentration of carbon dioxide in the atmosphere stood at about 280 parts per million, scientists have determined.

Average readings at the 11,141-foot Mauna Loa Observatory, where carbon dioxide density peaks each northern winter, hovered around 379 parts per million on Friday, compared with about 376 a year ago.

That year-to-year increase of about 3 parts per million is considerably higher than the average annual increase of 1.8 parts per million over the past decade, and markedly more accelerated than the 1-part-per-million annual increase recorded a half-century ago, when observations were first made here.

The Intergovernmental Panel on Climate Change projects that, if unchecked, atmospheric carbon dioxide concentrations by 2100 will range from 650 to 970 parts per million. As a result, the panel estimates, average global temperature would probably rise by 1.4 to 5.8 degrees Celsius (2.7 and 10.4 degrees Fahrenheit) between 1990 and 2100.

The 1997 Kyoto Protocol would oblige ratifying countries to reduce carbon dioxide emissions according to set schedules, to minimize potential global warming. The pact has not taken effect, however.

The United States, the world's biggest carbon dioxide emitter, signed the agreement but did not ratify it, and the Bush administration has since withdrawn U.S. support, calling instead for voluntary emission reductions by U.S. industry and more scientific research into climate change. See "CO2 buildup accelerating in atmosphere," USA Today, 20 June 2004 <[http://www.usatoday.com/weather/news/2004-03-21-co2-buildup\\_x.htm](http://www.usatoday.com/weather/news/2004-03-21-co2-buildup_x.htm)>.

<sup>31</sup> For detailed information and statistics about CFCs and their effects please visit the Columbia University Center for International Earth Science Information Network web sites. "Chlorofluorocarbons and Ozone Depletion," CIESIN, 20 June 2004 <<http://www.ciesin.org/TG/OZ/cfcozn.html>>, "Health Effects from Increased Exposure to Ultraviolet-B (UV-B) Radiation due to Stratospheric Ozone Depletion," CIESIN, 20 June 2004 <<http://www.ciesin.org/TG/HH/ozhlthhm.html>>, & "Environmental Effects of Ozone Depletion," CIESIN, 20 June 2004 <<http://www.ciesin.org/TG/OZ/o3depl.html>>.

<sup>32</sup> A. M. Mannion, Global Environmental Change: A natural and cultural environmental history (Essex: Longman Group, 1991) 2.

<sup>33</sup> Ibid.



### 3. WHAT IS A WEED?

A few definitions of *weeds*.

*Agronomist (an agricultural scientist):*

Plant is a weed in terms of human attributes with an emphasis on undesirable qualities of a particular species.

*Weed Scientist:*

Any plant of vegetation, excluding fungi, interfering with the objects of people. Or a plant growing where it is not wanted.

*Plant Ecologist:*

Pioneers of secondary succession of which an arable field is a special case.

*A compromise definition:*

Generally unwanted organism that thrives in habits disturbed by humans.

*Quote from weed science text book (Ross and Lembi, 1999):*

Plants that interfere with the growth of desirable plants (within an agricultural setting) and that are unusually persistent and pernicious. They negatively impact human activities and as such are undesirable.<sup>34</sup>

*A subjective definition may be:*

Plant whose virtues have not yet been discovered or plants for which humans have not yet found any use. Virtues of plants include the medicinal properties of weeds and their potential for soil reclamation through phytoremediation and allowing the soil to breath.

Weeds are plants, which are deemed by humankind to be undesirable based on their location and / or lifecycle behavior. Weeds can be plants that are harmful to humans or domesticated animals, cause allergies, suppress other plants, and compete with agriculture resulting in reduced harvest. Weeds do not occur from a single or small range of plant genus instead “weed” like behaviors are shared amongst a wide range of differering species of plant life. Weedy behaviors are exhibited among a diverse range of plant species, ranging from grasses, shrubs, and trees; with the reproduction strategies ranging from annual to perennial seeding to rhizomatic growth. Weeds are often associated with the agricultural context as they compete with crops planted for social – economical reasons.<sup>35</sup>



Weeds are not solely discussed within the specialized agricultural context, as the word “weed” is often used in the general lexicon. In the general lexicon, weeds are plants that interfere with the ubiquitous home and business lawn. Weeds in this setting are plants that interfere with the maintained “perfection” of the lawn. A weed in the manicured lawn is a plant that interferes, it looks different and grows different, in other words it is unsightly and outplace. It is an interloper that disturbs the western myth of humankind’s control and subjection of the physical world. As an interloper the weed must be exterminated.



Our relationship with weeds resulted in its verb tense to stand for; *“To free from noxious plants; to clear of weeds; to remove, as something hurtful; to free from anything hurtful or offensive.”*<sup>36</sup>

The weed is an extremely powerful force in which it’s name also signifies humankind’s struggle to extinguish it. The “War on Weeds” as demonstrated by the AOL screenshot demonstrates the continuing conflict, a conflict that initiated certain fields of science to develop means to contain weeds. In the agricultural sciences the development of the field of weed science contributed greatly to the understanding of plants and what makes some plants “weedy.” The various fields of sciences especially in the biological specialties contributed greatly to the damaging of the environment as a result of plant and plant pest management tech-

niques of herbicides and pesticides. The release of pesticides such as the infamous DDT resulted in not only killing many pests but also damaging the population count of various birds species.<sup>37</sup> Simultaneously multiple herbicidal brands have been banned as their side effects result in much greater environmental damage than their intended benefits provide.<sup>38</sup> Finally, the scientific field of genetic modification when applied to weed science inadvertently bred plants known as “super weeds”, weeds resistant to herbicides designed to exterminate them. Super weeds resulted from the unintended cross breeding between genetically modified herbicide resistant crops with common weeds resulting in weeds that contain genes that make them resistant to herbicides.<sup>39</sup>

Weeds are often discussed in negative terms but often this negative connotation is a result of a common lack of knowledge of the positive traits of “weedy” plants. A key positive attribute of a number of plants including weeds is phytoremediation, “the plant’s ability to remediate contaminated soil or groundwater”, and bioremediation, “the process by which living organisms act to degrade or transform hazardous organic contaminants.”<sup>40</sup> Phytoremediation is a natural process in which plants remove heavy metals and other toxic elements from contaminated soil.

Phytoremediation was famously proven by the artist Mel Chin and botanist Rufus Chaney in their revolutionary project, *Revival Field*. *Revival Field* was a pioneering project as it was one of the first collaborations between art and science that successfully proved a scientific process that was unsupported by the general scientific community. Mel Chin and Rufus Chaney proved that scientifically untrained individuals, artists, could address the environment in scientific means and in methods that benefit the environment. *Revival Field* was first implemented at Pig’s eye landfill in St. Paul, Minnesota, a state Superfunded site contaminated by zinc and cadmium. Chin and Chaney initiated *Revival Field* in order to prove that certain plants which are known to be hyperaccumulators of heavy metals can be grown in polluted sites in order to cleanse the soil of the toxic metals. Hyperaccumulators are plants, which have established a natural capacity to pull metals from the soil, allowing for the plants which have accumulated toxins to be safely harvested and disposed. The ability of certain plants to absorb toxic heavy metals is not new knowledge as history provides examples in which ancient metalsmiths (mostly in Africa) searched for these plants, as they could be indicators of metal concentrations.<sup>41</sup>

In Mel Chin’s own words *Revival Field*’s is “an artwork, envisioned as the sculpting of a site’s ecology, where the material is contaminated soil, instead of marble, and the tools are hyperaccumulating plants and scientific process, instead of chisels. The full realization of the work will be a revitalized ecology that can sustain diverse plant and animal life.”<sup>42</sup>



Mel Chin did not underestimate plants and their neglected traits, as he discovered that certain plants such as, “Maize, Merlin Red Fescue, Bladder Campion, Alpine Pennycress, and Lettuce, contain environmental healing capabilities by reducing the toxic levels of cadmium and zinc..”<sup>43</sup> Furthermore, Chaney, believes that a strain of Alpine Pennycress, a common weed, can be discovered that contains an even greater rate of absorption allowing it be used for bioremediation projects throughout Eastern Europe and China, areas polluted by high levels of cadmium.<sup>44</sup> Revival Fields also “launched the phytoremediation industry, which one business analyst predicts will be a \$400 million dollar business by 2005.”<sup>45</sup>



Cultural history also points to the ancient knowledge of plants as healers. Several plants, which in our modern age are defined as weeds were in previous ages known as possessors of healing attributes. Searching through cultural history finds that the common Milkweed and Dandelion belong to this category. Milkweed a common weed that grows throughout the entire globe is of the Asclepias family. The genus Asclepias was derived from Asklepios, the ancient Greek god of medicine and healing.



The common Dandelion, *Taraxacum officinale*, is often considered a weed as it “is at home in all parts of the north temperate zone, in pastures, meadows and on waste ground, and is so plentiful that farmers everywhere find it a troublesome weed.”<sup>46</sup> The name of the genus, “*Taraxacum*, is derived from the Greek *taraxos* (disorder), and *akos* (remedy), on account of the curative action of the plant.”<sup>47</sup> The common dandelion was long known as a beneficial plant because it “contains vital nutrients and minerals as well as vitamins A, B, C and D. Dandelion has been used for centuries as a primary herb that purifies the blood and flushes toxins out of the body, via the liver and kidneys. Rich in calcium, iron, potassium, phosphorus and sodium, Dandelion is ideal for treating high blood pressure and poor digestion.”<sup>48</sup>

As stated above a wide range of plants in the modern age are described as weeds because their positive traits have been largely forgotten or ignored. Furthermore, in the built environment of the contemporary city plant life has been largely forgotten or ignored. Plant life is often relegated to sidewalk boxes or occasional parks resulting in an urban ecology that is lacking a “green” ecology, and the benefits that result from a subsequent amount of plant growth. A built environment which is regularly defined by an urban landscape with occasional scattered “green” landscapes is an urban ecology riddled with various forms of pollution<sup>49</sup> and ecological damage.<sup>50</sup> As a result, the *Agents of Seed Dispersal* action seeks to introduce “forgotten” plant life into the contemporary urban setting in order to mend the ecology of the built environment.

Weeds are not simply plants with undesirable qualities growing in unwanted places. Weeds often emerge as a result of the intentional disturbance of territory, territory in which weed seeds were embedded but dormant. The act of marking the soil in order to construct the built environment results in the disturbance



of dormant seeds resulting in their germination. The agency of “human” development damages the soil by marking it and by eliminating the “plant” life that existed on it. Human development often results in the development of the built environment, but since it is an environment built by humankind it is a setting built with imperfections, cracks in sidewalks and asphalt parking lots. The fissures in the urban terrain serve as spaces in which the disturbed seeds germinate, take root, and overtime increase their population and furthermore increase the dimensions of the initial disturbed spaces. Weeds enter into a slow but steady deconstruction of the artifacts of human construction. Weed agency and human agency enter in a conflict, a conflict in which weeds emerge as the avant garde of plant life. Weeds are the shock troopers of “green” nature, as they slowly takeover and remediate disturbed and damaged territories, whether they are polluted with toxic material or asphyxiated by asphalt. Weeds are the vanguard of the plant kingdom and maybe even the entire physical “green” world.



*Images from decaying socialist housing blocks in Bucharest.*

<sup>34</sup> M.A. Ross, & C. A. Lembi, Applied Weed Science (Upper Saddle River, NJ: Prentice Hall, 1999) 452, qtd in. Professor, Antonio DiTommaso, “weed,” Weed Science CSS 315 Course Handout, 2003, Cornell Department of Crop and Soil Sciences, Ithaca: NY 36.

<sup>35</sup> Professor, Antonio DiTommaso, “weed,” Weed Science CSS 315 Course Handout, 2003, Cornell Department of Crop and Soil Sciences, Ithaca: NY 4 - 5.

<sup>36</sup> “Weed,” Webster’s Revised Unabridged Dictionary. Webster’s Revised Unabridged Dictionary 1998. Dictionary.com. 15-June, 2004 <<http://dictionary.reference.com/search?q=weed>>.

<sup>37</sup> “The lawn-care companies emphasize the number of people they employ and the fact that their pesticides and herbicides are registered with the government. This might imply that because they are registered, they are safe. DDT was registered with the government. After 30 years of use, wildlife biologists discovered it was killing all the birds. It was banned in 1972 but 27 years later it is still in the environment. A study on organochlorine pesticides, sponsored by the Quebec Health Ministry, showed between 95% and 98% of breast milk samples analyzed contained either aldrin, DDT or lindane. In each case, 3% of the samples contained more than the permissible level for cows milk. Only farms were sprayed with DDT back then and it is still here.” See “Pesticides and Herbicides,” Numberfour, Site created and designed by James Bredin, 09-Feb., 2004 <<http://jamesbredin.tripod.com/numberfour/id29.html>>.

<sup>38</sup> “Brita Filtration Benefits,” Brita, 2003. 20-June, 2004 <<http://www.brita.com/105.html>>.

<sup>39</sup> “Can transgenic crops create super weeds?” November 20, 1996 - An article in the October 11, 1996 issue of *Science* reported the opinions of an assortment of scientists on the potential for genes moving from transgenic crops to wild plants, therefore creating a “superweed”. As might be expected, there were a wide range of views on this topic. The article reported results of two studies that documented unusually high rates of gene flow between cultivated varieties of sunflower and strawberry into wild types of the two species. In sunflower, marker genes were found at a frequency of 28% in wild sunflower growing near fields where sunflower had been grown as a crop for 10 years, whereas the frequency was 38% after 35 years. An ecologist from Clemson University reported that 50% of the wild strawberries growing within 150 feet of a strawberry field contained marker genes from the cultivated strawberries. This relatively high rate of gene flow between cultivated and wild biotypes has raised the concern that genes from transgenic crops could move into wild plants, thereby creating a superweed. Researchers in Denmark found that the same movement can happen with genes from transgenic crops. They reported that a transgenic herbicide resistance gene moved from oilseed rape to its weedy relative, field mustard (*Brassica campestris*).” See “Can transgenic crops create super weeds?,” Science 1996, Vol. 274:180-181, summarized by Bob Hartzler, Weed Science 2002, Iowa State University, 20-June, 2004 <<http://www.weeds.iastate.edu/weednews/transgen.htm>>.

<sup>40</sup> Steve Bentjen, “Bioremediation and Phytoremediation Glossary,” 1998, 20-June 2004

<<http://members.tripod.com/~bioremediation/>>.

<sup>41</sup> Editors Barbara Nemitz, & Thomas von Taschitzki, trans I plant: LIVING VEGETATION IN CONTEMPORARY ART. (Ostfildern-Ruit: Hatje Cantz, 2000) 40.

<sup>42</sup> Ibid.

<sup>43</sup> M. Bjork, L. Davis L, & M. Medeiros, "Phytoremediation," 2003, M.University of Washington, Green Technology, 20-June 2004 <<http://online.caup.washington.edu/courses/larc433/Phyto/Case.htm>>.

<sup>44</sup> Amy Adams, "Let a thousand flowers bloom....," New Scientist, 20-December. 1997: vol. 156 - 2113. RBI Limited. 20-June, 2004 <[http://home.earthlink.net/~adamsamy/PDFs/Thousand\\_flowers.pdf](http://home.earthlink.net/~adamsamy/PDFs/Thousand_flowers.pdf)>.

<sup>45</sup> Sue Spaid, "Mel Chin (with Dr. Rufus Chaney)," 2002, Greenmuseum, 20-June 2004 <<http://www.greenmuseum.org/c/ecovention/revival1.html>>.

<sup>46</sup> M. Grieve, "Dandelion," 2003, Botanical.com, 30-June 2004 <<http://www.botanical.com/botanical/mgmh/d/dandel08.html>>.

<sup>47</sup> Ibid.

<sup>48</sup> "Dandelion Root," 11-April 2004, Viable Herbal Solutions, 30-June 2004 <<http://www.viable-herbal.com/singles/herbs/s215.htm>>.

<sup>49</sup> "Increased traffic congestion/air pollution: Americans spend 55 eight-hour workdays behind the wheel of their car. As urban areas spread out, more time is spent in cars, and traffic congestion occurs over a larger area. Adding new lanes to highways doesn't solve the problem. Air pollution in urban areas remains a problem. Over 60 urban areas are not within the Environmental Protection Agency's (EPA) guidelines for carbon dioxide or ground-level ozone. What's more disturbing is that pollution now affects smaller communities outside major metropolitan areas. As a by-product of increased air pollution, people suffering from chronic respiratory illness has increased to about 20,000-40,000 cases annually with the annual number of premature deaths from "cardiopulmonary causes linked to particulate air pollution" at around 64,000. For some asthma sufferers, air pollution can trigger an asthma attack." See "Urban Sprawl Changes Landscape." 21-Jan. 2000, Riverdeep.net, 30-June 2004 <<http://www.riverdeep.net/current/2000/01/front.210100.sprawl1.jhtml>>.

<sup>50</sup> "The transformation of the urban land surface by paving and construction creates a set of hydrological effects clearer and more uniform than those produced by rural land-cover change. Urbanization produces more rapid runoff and greater peak flow downstream. Floods become higher and more frequent. These effects are not of much importance in the global water budget, but they can be considerable in the downstream basin." See Ibid.



## 4. THE RHIZOME.

The rhizome in botany is “a horizontal plant stem with shoots above and roots below serving as a reproductive structure also called a creeping rootstalk or rootstock.”<sup>51</sup> “Many plants have rhizomes that serve to spread the plant by vegetative reproduction, a process by which new plant ‘individuals’ arise or are obtained without production of seeds or spores (cloning).”<sup>52</sup> “The rhizome is an expanding underground root system, sending up above ground shoots to form a vast network. Difficult to uproot.”<sup>53</sup>



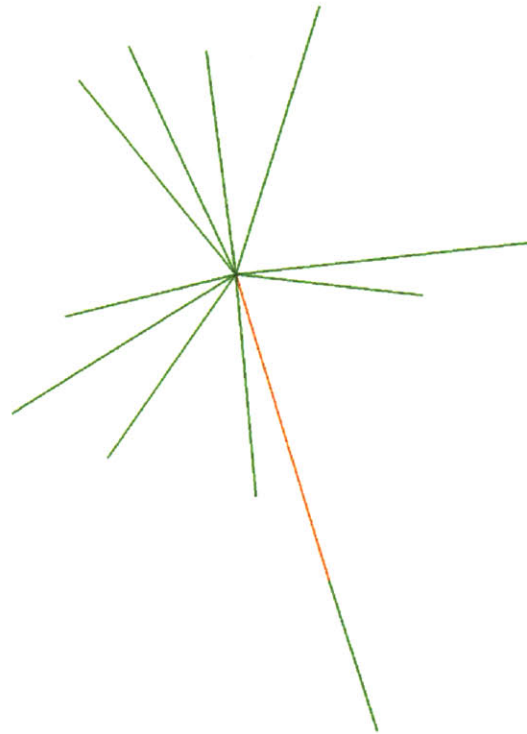
The concept of the rhizome as a decentralized system, “machine”, of individual nodes without a hierarchical organization which spread through a constantly expanding network opposed to stratification or segmentation was largely a result of Gilles Deleuze and Felix Guattari’s book *A Thousand Plateaus: Capitalism and Schizophrenia*.<sup>54</sup> Deleuze and Guattari referred to the rhizome as a machine assemblage in opposition to “the tree” and its arborescent structure. The tree for Deleuze and Guattari represented a stratified linear hierarchical system, one that established castes and classes, one that limited and controlled. The rhizome for Deleuze and Guattari was the opposite as it was a system that opposed hierarchical stratification through “lines of flight, movements of deterritorialization and destratification.”<sup>55</sup> The rhizome as it expands along a horizontal structure grows vertical shoots, shoots that are individual nodes without hierarchical superiority. The shoots emerge from the rootstalk of the rhizome resulting in each shoot sharing the same root structure, a structure that grows in all directions without hierarchy or central authority. Additionally, the rhizome reproduces asexually allowing for the rootstalk to be separated at any point in its arrangement resulting in its divorced part to continue its own growth, as its detached element does not need to be connected to the original composition to survive, grow, or reproduce.

The rhizome is truly a democratic system, wherein each element of the system is equal. The rhizome is a near literal example of the democratic system as all elements of the rhizome emerge from the same base, the rootstalk. In which the rootstalk of each individual rhizome is a detached element of the original not a clone or a copy. As each rhizome is of and from the original, than “an” original cannot exist as each rhizome is the original, resulting in the erasure of a central authority. Equally, the shoots of the rhizome are democratic elements of the total structure as each shoot emerges from the rootstalk in order to benefit the whole. Each shoot collects sunlight and water and converts them into life sustaining elements for the entire composition. The shoots do not exist as independent systems instead they exist as individual but equal interconnected nodes of the vegetative structure. As with the individual rootstalks no shoot is a central authority or is divided into a stratum. The shoots are equal elements of the democratic whole working uniformly for the whole.



The rhizome stands in opposition to the hierarchical structures of human planning and urban development. The rhizome moves under the surface establishing its own network, one which is hidden from view. The rhizome as it expands below the surface simultaneously sends up shoots to probe the urban surface for

cracks and openings. Once a shoot discovers an imperfection within the built surface, the shoot forces, penetrates, itself through it. The rhizome in the urban context deconstructs the built environment, as it seeks and exploits imperfections in its construction. The images above demonstrate the deconstruction from the growth of the rhizomatic Milkweed and Japanese Knotweed, as the shoots do not simply penetrate the asphalt, they also break it apart. The forced fractures in the surface promote further growth in the deconstructed spaces, which result in further expansion of the deterritorialization of the urban space and the reterritorialization of the green space.

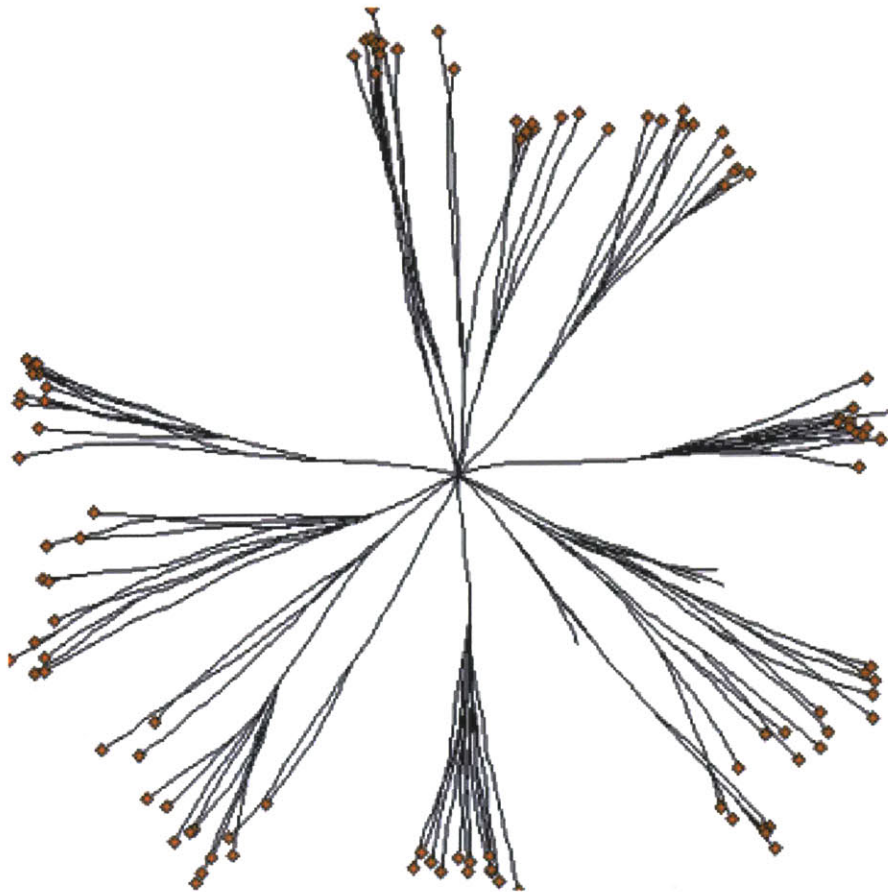


Rhizomatic deconstruction is not limited to a single node in the rhizome instead it occurs along the entire length of the rootstalk. The rhizome deconstructs the terrain along its entire path as it shoots constantly prod for weaknesses in the surface of the city. Deleuze and Guattari quoting Carlos Castaneda in the *Treatise on Nomadology – The War Machine* discuss the deterritorializing process of the ambulant model, a model which also defines the base of the deconstruction process of the rhizome. The ambulant model is one in which a subject moves from point to point or moreover in-between points, it is a model that translates into the rhizomatic model of movement, a model which is designed to prompt flows in every direction.

*But with the ambulant model, the process of deterritorialization constitutes and extends the territory itself. “Go first to your old plant and watch carefully the watercourse made by the rain. By now the rain must have carried the seeds*

*far away. Watch the crevices made by the runoff, and from them determine the direction of the flow. Then find the plant that is growing at the farthest point from your plant. All the devil's weed plants that are growing in between are yours. Later .. you can extend the size of your territory.*<sup>56</sup>

As stated by Deleuze and Guattari the ambulant model is one in which its process deterritorializes along its entire path, from point A to point B, claiming everything in between. The rhizomatic model builds itself from the ambulant model as it equally deterritorializes along its path. But the rhizomatic model is not limited to a single vector, as found within the ambulant model, because the rhizome expands across many vectors simultaneously. The rhizome expands along every direction of the horizontal axis while escalating itself along the vertical axis. An onlooker can truly survey how the rhizome deconstructs by observing all visible shoots within a landscape, knowing that in-between each visible point exists the rootstalk, continuously extending the scope of its deterritorialization.





<sup>51</sup> “Rhizome,” Wikipedia, 14-June 2004, Wikipedia the free encyclopedia, 05-June 2004 <<http://en.wikipedia.org/wiki/rhizome>>.

<sup>52</sup> “Vegative Reproduction.” Wikipedia, 24-March 2004, Wikipedia, the free encyclopedia, 30-June 2004 <[http://en.wikipedia.org/wiki/Vegetative\\_reproduction](http://en.wikipedia.org/wiki/Vegetative_reproduction)>.

<sup>53</sup> “Who We Are,” 2002, Rhizome Collective, 30-June 2004 <<http://www.rhizomecollective.org>>.

<sup>54</sup> Giles Deleuze, & Felix Guattari, A Thousand Plateaus: Capitalism and Schizophrenia, (Minneapolis: University of Minnesota Press, 1987).

<sup>55</sup> Giles Deleuze, & Felix Guattari, A Thousand Plateaus: Capitalism and Schizophrenia, (Minneapolis: University of Minnesota Press, 1987) 3.

<sup>56</sup> Giles Deleuze, & Felix Guattari, A Thousand Plateaus: Capitalism and Schizophrenia, (Minneapolis: University of Minnesota Press, 1987) 372.



5. THE CITY AS A WEED.



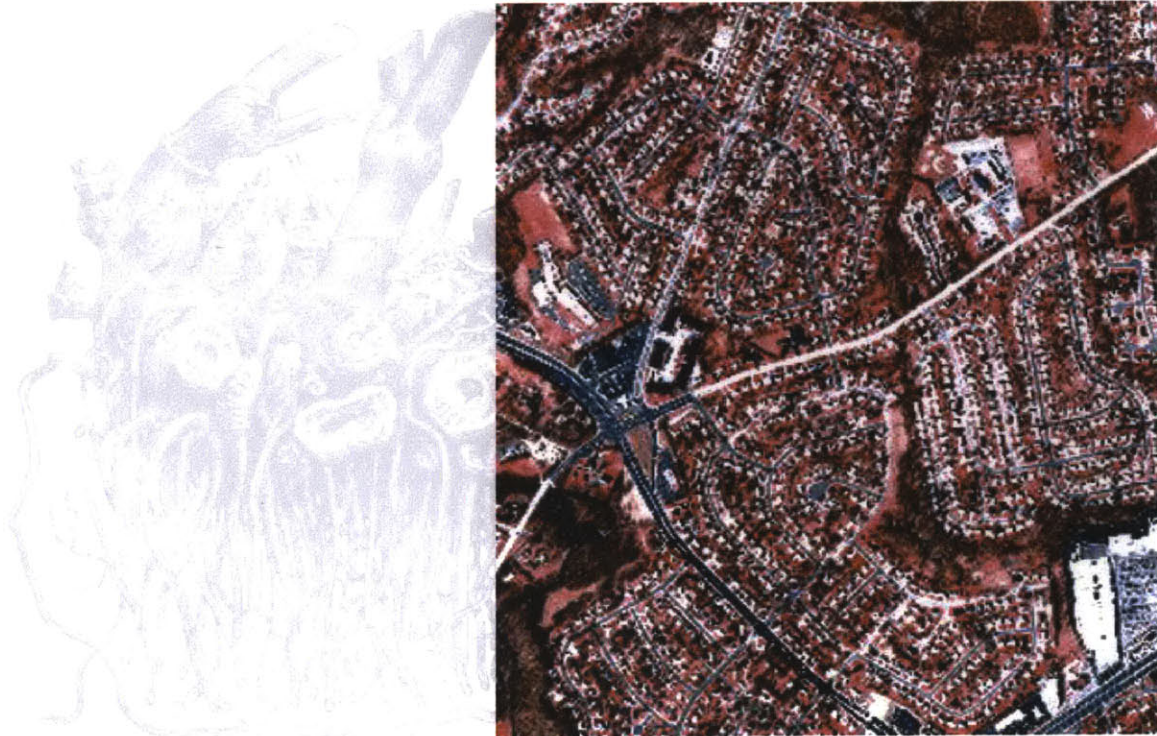
*Still image from Doug Aitken's "Rise."*

The notion of the city as being a part of the biological system of nature is a view that has not until recently been a part of the institutional science field. The historic notion of the city has been one of the city as an artificial construction built on top of wilderness, in which wilderness became the only definition in the western perspective of the natural environment. The city was seen as an unnatural space, a space detached from nature and likewise any ecological views and developments.

Plant and animal life since at least the advent of the agricultural age has been regulated and manipulated by the human beings in order to fit their needs. Plants have been manipulated by man-made agriculture systems and herding techniques likewise have equally regulated animals. In the city the view of these elements of nature as being subservient to mankind has been exaggerated to the point that many of the plants and animals, which exist in the city, exist primarily to fulfill an aesthetic function. In the urban context any plant – animal life that is deemed as unbeneficial or un-aesthetic is slated for extermination. Certain animals and plants need to be controlled in order to improve the human standard of living within the urban setting in order to reduce the transmissions of diseases from pests and rodents, but at the same time many of the remaining extermination campaigns public (city, municipal) and private (home lawn) are solely initiated in order to fulfill misguided aesthetic perceptions (weed extermination).

Biologists / environmental scientists and the society at large until recently have failed to realize that the city is a natural ecosystem.<sup>57</sup> The city might be an artificial ecosystem but it is natural since human beings build it, and human beings are organisms of the physical world. The artifacts of human construction are as a result natural because they are formed by human beings, and simultaneously because they exist in the physical universe. In this manner since we construct cities, the city is natural and in return since it is an environment in which organisms exist, it is an ecological system. Currently a few ecologists are beginning to study the city as an ecological system in order to understand the urban environment's impact on the health of its inhabitants and the overall environment.

The urban environment is defined as one in which the city occupies and is built on top of a previous biological ecosystem. The urban environment is constructed mostly with asphalt and concrete in a manner in which these elements are used to cover the previous ecosystem. The cover is primarily impenetrable resulting in the surface of the city becoming a structure, which suffocates the previous environment. At the same time the urban environment continues to spread outwardly as a result of human population increase and the development of the automobile and the urban – suburban driving culture.<sup>58</sup>



The city in essence is a weed. The city appears in a host environment and over time, “in which time is based on the rate of human population growth, the de-

mand on earth's resources per person (wealth per person), and the percentage of use per unit of resource as the rate of technological development,<sup>59</sup> expands across and over its host environment. The urban context of the city with its impenetrable asphalt and concrete surfaces is equally defined by its density and by its sprawl. The definition of a weed is similar to the definition of the city, an organism that is solely defined by its density and its ability to populate an environment. What is different between our perspective of the city and the weed is that the city is seen as a wanted and valuable asset while the weed is seen as unwanted. The city as a social – economical valuable asset and as an ecosystem that supports human life becomes the principal environment in which the human race seeks to establish and maintain its existence. The weed in return since it has no beneficial aspects applied to it becomes an unwanted organism and eliminated within the human ecosystem.

The city does not solely effect the environment that it occupies but it also effects it's surrounding environments; suburban, rural, and wild. The city is not simply an intrusion upon the biological environments instead it is a man-made (artificial) but natural environment, an ecosystem. The urban ecosystem is an ecosystem in which many life forms continue and maintain existence, but the urban ecosystem is also an environment that reduces instead of sustains biological – ecological diversity. The urban ecosystem needs to be understood and proclaimed by the (urban) ecologist and the city dweller as an environment, which has to maintain ecological diversity in order to sustain a healthy standard of living for all humans and life forms within the urban context and the total context of the Earth. The urban setting should not been defined solely by the impenetrable surfaces of the city but also by the various surfaces of the earth, resulting in an urban surface that maintains a wide ranging diversity of life in the urban ecosystem.

<sup>57</sup> P.C. Lord, Dr. E. Strauss, & A. Toffler, "Natural Cities: Urban Ecology and The Restoration of Urban Ecosystems." 2003, LexisNexis Environmental, Ithaca, 01-June 2004 <<http://web.lexis-nexis.com/envuniv/printdoc>> 2.

<sup>58</sup> "Even so, densities of urban population today, at least in the developed world, do not match those of the nineteenth century and earlier. City dwellers dependent on horse and foot as the principal means of getting around lived in a congestion that automobiles and mass transportation have done much to diminish. The change has been most evident in the developed world, whose central cities have often declined in population as suburbs and exurbs have grown. The compact and crowded early modern city has in the wealthier countries now been replaced by the sprawling low-density metropolis in a process of "counter-urbanization" (Berry 1990). Even in the developing world, densities have fallen, which is to say that the land required for each new city dweller, and thus the urban pressure on the surrounding area, has grown. Mexico City is today's epitome of uncontrolled Third World megacity growth. Yet it too reached its peak population density at around 20,000 people per square km in the early twentieth century. Today, though its population is twenty times higher and its settled area vastly greater, Mexico City's overall density is less than 15,000 per square km (Ezcurra 1990: 580)." See B. J. L. Berry, "Urbanization." 1990. and E. Ezcurra, "The Basin of Mexico." In William B. Meyer, Human impact on the earth. (Cambridge: Cambridge UP, 1996) 75.

<sup>59</sup> One formula for distinguishing the sources of human impact was introduced by Ehrlich and Holdren (1971) and is now widely used. It notes that human pressure or impact on the environment, I, is equal to demand on the earth's resources per person (A, for affluence) times the number of people (P, for population) times the impact per unit of resource use, a factor of technology (T):  $I = PAT$ . In that form, it is simply a mathematical identity, but it has often been taken in a broader sense as indicating that high levels of impact are likely to be associated with large and/or affluent human populations. Higher populations and standards of consumption (high values of P and A), the formula indicates, lead – all else being equal – to greater impact on the environment. Changes in technology (T) can independently raise or lower impact by making resource use more or less efficient.

Prevailing trends in population, affluence, and technology have long been represented the three most persuasive arguments for the reality of social progress. Belief in progress, for centuries a cornerstone of western thought, found its surest prop in the material advances embodied in the extraction of resources and the transformation of the landscape to support the growing numbers. The horrors of what people did to one another might persist, but what they did to the world around them represented all but unassailable evidence of improvement. For most of modern history, increases in numbers, wealth, and technological capacity have been seen as unalloyed advances. If they caused environmental change, it was change for the better. They now tend to be seen as the three horsemen of environmental apocalypse, the most prominent candidate causes of environmental change seen as change for the worse. No longer does the earth seem vast and inexhaustible in the face of the demands that they can place on it. See William B. Meyer, Human impact on the earth. (Cambridge: Cambridge UP, 1996) 24.



## 6. MANUAL FOR ZOOCHARY INTERVENTION.

The first aspect of the *Agents of Seed Dispersal* project is an intervention in the urban space of post-industrial asphalt lots in which the author, as the agent of intervention, bores through the asphalt surface in order to reach the underlying earth. The penetration is intended to allow the asphyxiated earth below the barren surface to be able to breathe, and simultaneously to be an opening in which wild plant life are able to take root. The revived plant life in return slowly mends the underlying stifled soil and over time deterritorializes the barren asphalt by reterritorializing into a space of (green) growth. The action is demonstrated through documentation, which was recorded at the sight of intervention. The manual of Zoochary intervention will consist primarily of images with interspersed text to explain the process of execution.

### A. Site.

The site chosen for the Zoochary intervention was located at the Visual Studies Program at building N51 at 265 Massachusetts Avenue in Cambridge, Massachusetts.







B. Drilling.

The first step in the intervention was to puncture holes in the surface of the parking lot. The drilling was accomplished with a high-powered hammer drill, which allowed the agent to drill through the asphalt surface and its concrete subsurface. The total depth of drilling ranged from two to six inches before the underlying soil was reached.



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C. Results from Drilling.

The outcome of the drilling was the formation of fifty one, four - six inch deep by one inch wide punctures.

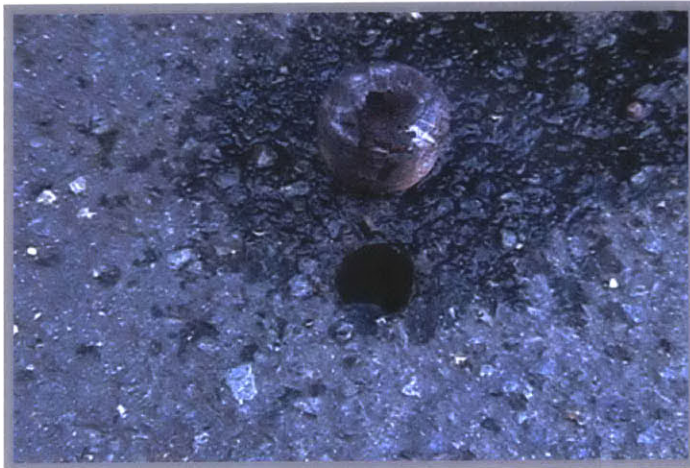


D. the Peat Moss Seed Pod.

The seed pod served as an important element, as it contains high nutrient peat moss that is often used as a starter medium for seeds. The pods are simply made of dehydrated and compacted peat moss wrapped in a porous gauze netting. The peat moss pellets expand more than six times their compressed size after they are immersed in water. After the pods are fully expanded, five to six seeds are placed within their structure. The expanded pods serve as a perfect growing medium for seeds as they are highly nutritious and porous, and their mesh netting forms an expanded pod structure that is vertical and round; a perfect structure to place within the hollow punctures of the penetrated pavement.



E. Video captures of placement of Seed Pods within Fissures.





F. Lot with Punctures.

Red construction flags were placed within the gaps in order to mark them as spaces of action. Construction sites use these flags in order to mark a space as one of construction / deconstruction. They mark the space as one of activity, flow, deconstruction, and transformation. They are a visual cue of flow; they function similarly as the shoots of a rhizome, a perceptible indication of the state of demarcation. As such, the flag's function is adapted for the intervention in order to mark the drilled holes as an active space of change.





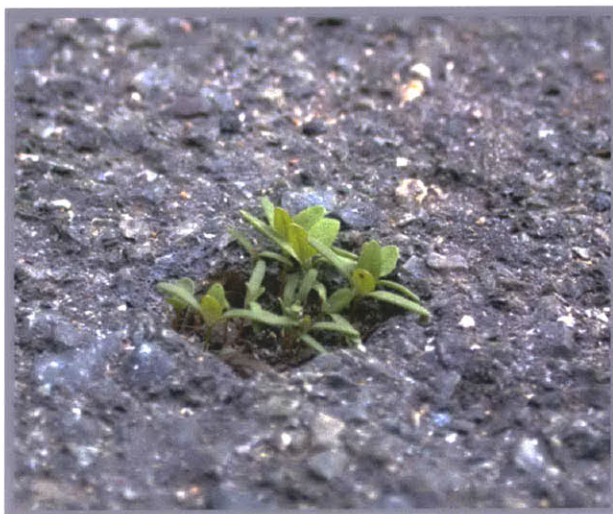


G. Early Growth Stages.

A time lapse sequence of growth within the punctures of the asphalt lot.



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AGENTS OF SEED DISPERSAL



AGENTS OF SEED DISPERSAL



H. Late Growth Stages.

A time lapse of plant development in mid-June after four months of growth.



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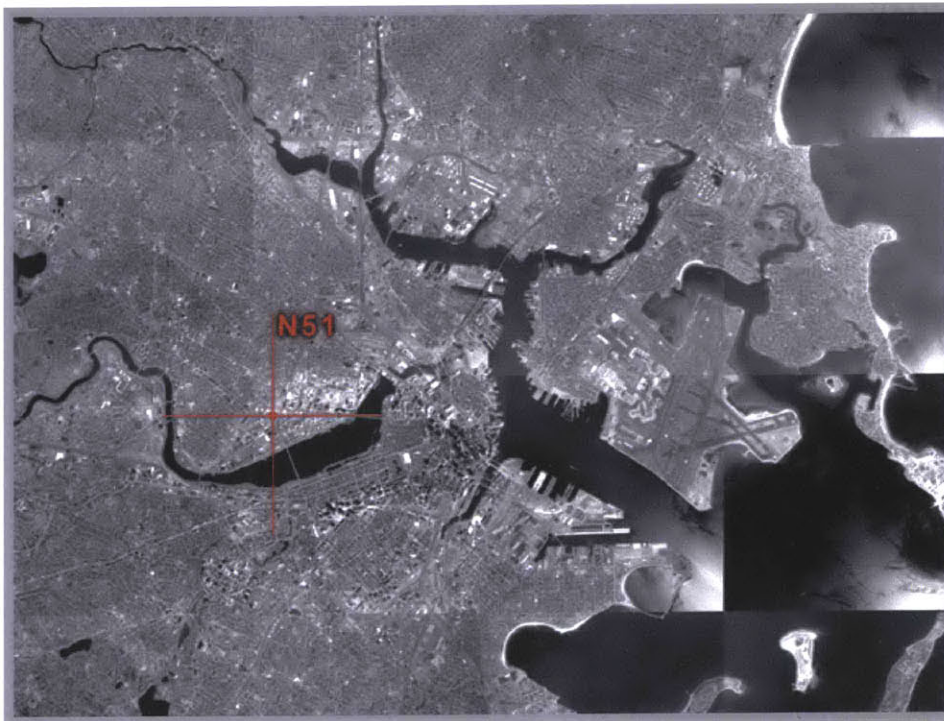


## 7. MANUAL FOR ANEMONOCHORY INTERVENTION.

The second action is the deployment of aerial seed delivery technologies in order to traverse across and above walls, boundaries, and onto and into urban areas that are limited to public access and action by physical or authorized restrictions. The aerial delivery mechanism is built out of several modified items; helium filled biodegradable trash bags which are modified with tape and safety pins in order to carry an attached porous mesh bag that releases seeds as the “balloon” system flies above the urban environment. The released seeds are scattered and distributed throughout the entire urban territory until they embed themselves into cracks and gaps in order to take root. Furthermore the system is used to deliver seeds of plants whose population has been severely reduced as a result of the transformation of their previous biological ecosystems into the modern-day urban ecosystem. This action is also demonstrated through documentation that was recorded at the sight of intervention (building N51). The manual of Anemochory action is also a visual documentation.

### A. Site.

The site chosen for the launch of the anemochory project was the same lot used in the Zoochary project. The site allowed for the release of seed carrying balloons within a center location in the Boston metro area. This location allowed the released balloons to continually travers over the urban area without regard to the direction and speed of the wind.





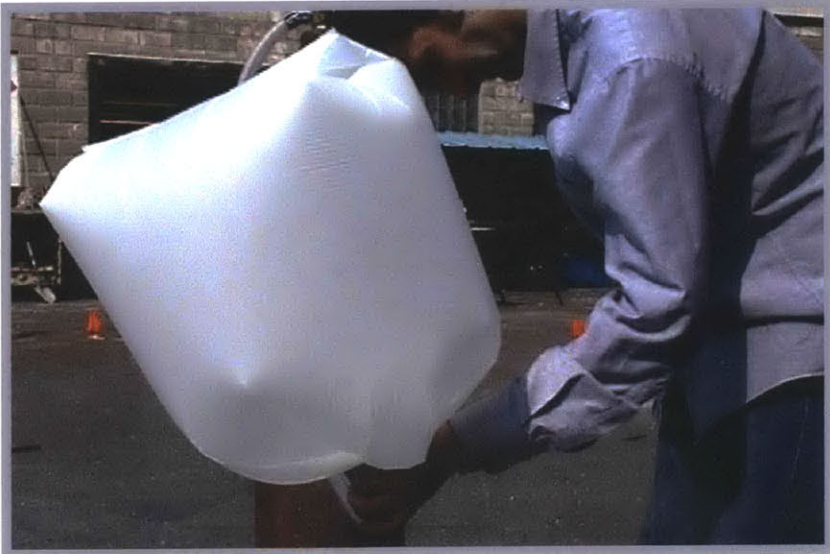
*Satellite view of site of intervention.*



B. The Process.

The process is detailed through an image documentation of the construction of the aerial seed delivery device. Equipment necessary for assembly includes helium, biodegradable “plastic” bags, safety pins, scotch tape, and porous netting. The netting is the mesh used for the peat moss pellets. The web is designed to hold the peat soil while being porous for water release. The netting functions well as a holder of seeds, while at the same time slowly discharging seeds through it’s minute openings.



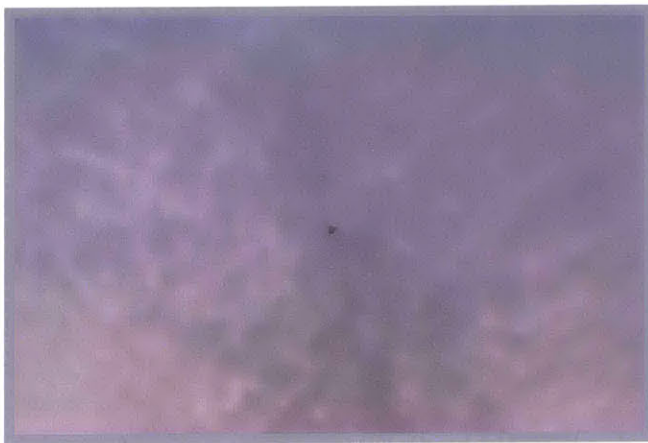
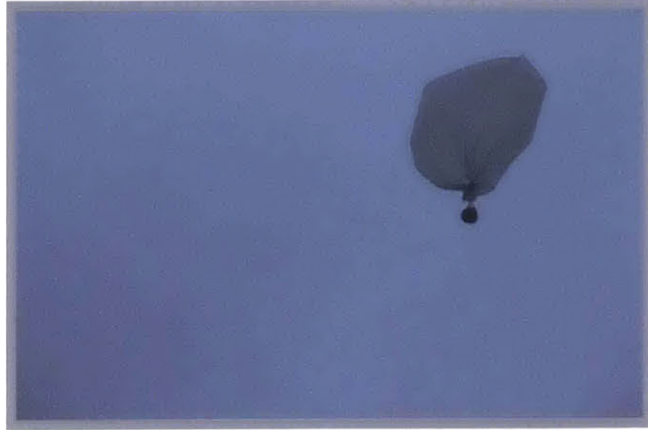








C. Images from Flight.

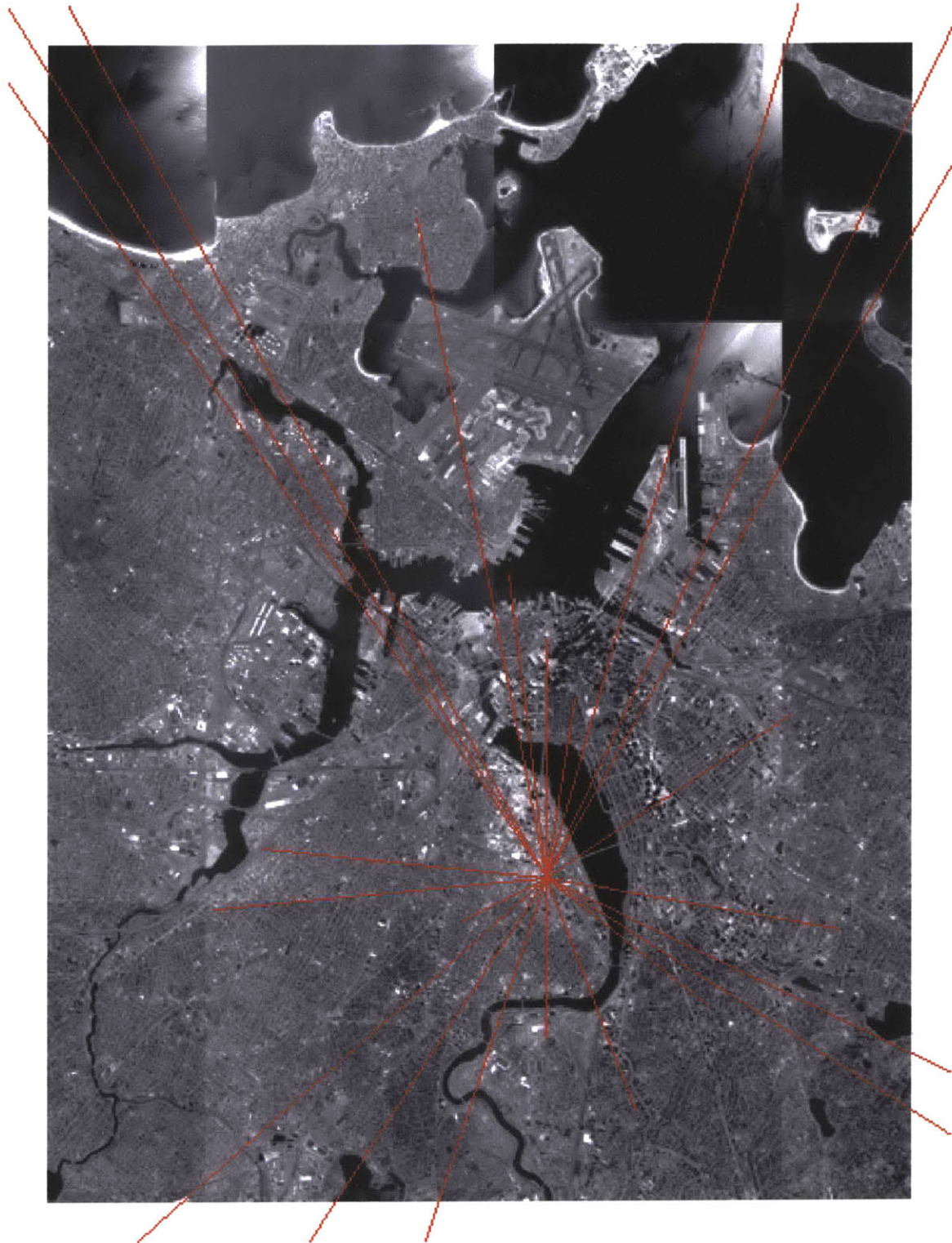




D. Landing



E. Vectors of Dispersal.





## 8. THOUGHTS AND CRITICISMS FOR FUTURE IMPLANTATION.

The primary criticism, which the author seeks to address, is to take the Zoochary project outside of the boundaries of building N51. Building N51 served as a perfect trial site as it is a largely abandoned asphalt parking lot. Abandoned parking lots and building rooftops serve as perfect sites for appropriation for urban reclamation. These sites act as an impenetrable surface preventing the previous system of interaction between the atmosphere, the biosphere, and the hydrosphere. Plant life can be introduced into these sites, of course each context would be different but the reintroduction of green life into urban space results in an improved environmental feedback in the urban situation. An increase in green space benefits the urban ecosystem by reducing the amount of water runoff, particle and noise pollution, and by increasing the biodiversity of animal and plant life. In order to address the main criticism, the Zoochary action needs to expand beyond its initial site. The site served as a proving ground, which successfully demonstrated that plant life can be introduced into these sites and that they can subsequently flourish.

In order to address the key criticism the author created a new project, the Anemochory (wind) action. The Anemochory project allowed the author to distribute seeds through out the urban environment without being restricted by physical boundaries. The project successfully delivered seeds through out Boston allowing the seeds to embed themselves into it's cracks and gaps. At the same time it is extremely difficult to document the results but it is pleasing to be able to make art in which every aspect of its creation is not controlled or calculated. The Anemochory action moves outside of the boundaries of the proving ground but the project's results are difficult to discover and document.

The next step is to either create a third implantation or expand the scope of the original two actions. To increase the scope of the initial actions requires the author to increase the number of times each action is implemented. It is not difficult to increase the number of balloon releases but it is difficult to find lots, which can be used for the Zoochary project. The solution seems to be to do both, continue releasing balloons and finding lots that can be reclaimed. At the same time a third plan is in development.

The third plan consists of the author manufacturing red clay bricks. These bricks are the standard red brick but with a key difference, seeds will be mixed into the brick solution. One key issue which still needs to be worked out is that bricks need to be baked in order to harden them. At the same time the author's bricks do not need to be extremely hard as they serve as a growing medium for the implanted seeds. Keeping this in mind the author should be able to make bricks by drying them in the sun and / or in a low temperature kiln. After the bricks are dried the next step is to introduce them into appropriated spaces. This will require replacing bricks found in city sidewalks and in the side of buildings with

the new and improved bricks. The implanted bricks after a short period of time, in the sun and rain, reterritorialize the spaces by sprouting new plant growth.

The third action continues the trajectory of the prior projects as it serves as a means to infiltrate the urban space in order to promote the growth of green space. The brick project introduces a new element into the Agents of Seed Dispersal project as it allows plants to simultaneously emerge from horizontal (sidewalks) and vertical (building walls) spaces. Furthermore the bricks will allow a continuation of the Zoochary project, as the author will no longer need to drill in order to implant seeds into the city surface. The crucial solution is to maintain the projects in their various forms as each form will further address and serve to mend the damage which results from urban environmental degradation.





9. WEEDS IN DETAIL

All the information in this section is compiled from various websites, all website links are located in the endnotes. The information is not quoted as all information in this section is from the noted websites. The author italicized certain facts in the text in order to highlight interesting facets of each plant.

This final section contains detailed information of three plants, which were inspirational in the development of the *Agents of Seed Dispersal* project. The first plant discussed is Velvet Leaf as it is a fast and hardy grower that thrives well in sunny and hot environments, a perfect description of a black top lot in the summer. Velvet Leaf also was the main plant grown in the back lot of building N51. The second plant discussed in detail is Japanese Knotweed, a weed that is infamous for its rapid spread due to its highly successful rhizomatic method of reproduction. The final plant is the common Milkweed, whose seeds were delivered throughout the Boston metro area by the Anemochory Intervention.

A. VELVET LEAF

*Abutilon theophrasti*



A member of the Mallow family is related to cotton, hollyhocks, and numerous weeds. Other common names include buttonweed, Indian mallow, butterprint, piemarker, velvetweed, and cottonweed. The preferred name, velvetleaf, amply

describes its velvety-textured, hairy-surfaced leaves. A native of China and presumably introduced into the U.S. from India as a fiber crop, this annual weed is adapted to cropland throughout most of the United States.

*Seed:*

Velvetleaf grows only from seeds that germinate throughout the growing season. Triggered by day length, flowering begins in July and continues until there is a killing frost. Mature seed is present about 3 weeks after flowering. *Velvetleaf seeds exhibit considerable dormancy, which can enable them to survive over 50 years in the soil.* Scarification of the hard seed coat by microbial action, soil action, or tillage permits water entry and germination. Maximum germination occurs in the top 2 to 3 inches of soil, but ceases below 6 inches.<sup>60</sup>

*Beneficial:*

Velvetleaf was used as a fiber crop in China since 2000 B.C. The stem and branches of velvetleaf produce long strong fibers used for cord, rope, binder twine, fishing nets, coarse cloth, paper and a caulk for boats. The seeds are eaten in China and Kashmir.

*Habitat:*

Adapted to cropland throughout most of the U.S., velvetleaf grows the best in rich soils of cattle yards and feed lots. *Velvetleaf is a common weed of waste areas, roadsides, vacant lots, fencerows, and around farmsteads where it is found in barnyards, cultivated fields, and gardens.* The colonists cultivated velvetleaf fiber for needed rope and cloth. Velvetleaf was probably introduced to the U.S. before 1700, as it was widespread on the east coast in the early-1700's. The economic gains did not materialize, but farmers continued to cultivate it for 100 years.<sup>61</sup>

B. JAPANESE KNOTWEED

*Polygonum Cuspidatum, Fallopia Japonica, & Reynoutria Japonica.*

Japanese knotweed belongs to the plant family Polygonaceae, the knotweeds. 'Poly' meaning many, 'gony' from the Greek 'knee' meaning jointed. *In Japan, the plant is commonly called itadori (meaning 'heals the sick'). Japanese knotweed, a rhizomatous perennial is native to Eastern Asia, and is one of the first plants to appear on volcano slopes after volcanic activity.* It was introduced to the UK as an ornamental in 1825, and from there to North America in the 19th Century. It appears to require high-light habitats, and does very well along roadways and rivers. *It reproduces by seed and large rhizomes, which may reach a length of 40 to 60 feet.* A small piece of rhizome can float down a river and begin to grow once it is deposited on land. These buried rhizomes have grown through 2 inches of asphalt. *Japanese knotweed thrives on disturbance and has been spread by both natural means and by human activity.* In the past, transportation of soil containing rhizome fragments have been a major cause of spread, particularly in the urban environment.<sup>62</sup>



*Distribution:*

Japanese Knotweed is native to Asia, and was first introduced to Europe in the mid-18th century by Phillipp Franz Balthasar von Siebold, a Bavarian physician in the Dutch East Indies Army. Siebold, stationed in Japan, smuggled two

shipments of Asian plants home to Europe, and among these was *F. japonica*, though at the time it was known by a different name. From there, cuttings were introduced into England, and by the late 18th century were being sold in nursery catalogs in the United States.

*This is yet another example of a plant introduced in the U.S. over one hundred years ago, which has within the past decade become known as one of the more populous invasive plant species.* While botanists and horticulturists of the 19th century did realize *F. japonica*'s potential for rapid and persistent growth, it occurred in such isolated populations that its potential for serious habitat alteration must not have been recognized. Stone (1913) identified both *F. japonica* and a related species, *F. sachalinensis* (Giant Knotweed), as becoming naturalized on the grounds of Massachusetts Agricultural College, where they were introduced as potential forage plants. Bicknell (1908-19) noted that while Japanese Knotweed was growing on the island of Nantucket, it only showed "...some tendency to escape from cultivation". The Preliminary Lists of New England Plants - IX Polygonaceae (1902), published in *Rhodora*, identified *F. japonica* as being cultivated, but escaped "only in the immediate vicinity of gardens."

*Japanese Knotweed is now an exceedingly common site in the urban and suburban landscape of Massachusetts.* It is easily found along roadsides and also in riparian areas, where it thrives in the moist soil and forms new populations when the flow of water breaks off portions of rhizomes or stem growth and sends them downstream. Land managers have a difficult time removing these plants from areas once they have become established due to the rhizomes that can continually produce more stems.<sup>63</sup>

*Reproduction:*

*The biggest female in the world!*

Japanese Knotweed is one of the most extraordinary examples of an invasive plant known. Firstly it is a giant herb, which every spring grows rapidly to a height of 2 or 3 meters, only to be cut down by the first winter frost and grow afresh the next spring. It is actually a dioecious plant, which means that you need male and female plants for sexual reproduction to occur; yet in Europe, so far, we only have female plants. Not only is it a single sex, it is also a single clone, as work carried out at the University of Leicester has shown. Given that it must occupy many thousands of hectares in Britain alone (the same clone is also known to occur in continental Europe and North America), in total biomass terms, it is probably the biggest female in the world! It is presently widely distributed around the British Isles, but what must be remembered is that it has achieved this distribution solely by vegetative reproduction. That is, it has spread by cuttings or from pieces of rhizome, whether deliberately as cultivated plants or discards from gardens, or inadvertently, spreading downstream along rivers or being spread by road works or site redevelopment involving an infested area.<sup>64</sup>

C. MILKWEED  
*Asclepias tuberosa*  
*Butterfly Weed Seeds*

*Asclepias verticillata*  
*Whorled Milkweed Seeds*



*Asclepias*: derived from Asklepios, the Greek god of medicine and healing.

*Monarch larvae appear to feed exclusively on milkweeds in the genus Asclepias and several other genera of viny milkweeds in North America. Milkweeds are perennial plants, which means an individual plant lives for more than one year, growing each spring from rootstock and seeds rather than seeds alone. In the Midwest, milkweeds were historically common and widespread on prairies, but habitat destruction has reduced their range and numbers.*

This genus consists of herbaceous plants with a milky juice, which are for the most part natives of America. Several species are cultivated for the sake of their showy flowers. All of them are more or less poisonous. *Asclepias curassavica* is employed in the West Indies as an emetic, and goes by the name of *Ipecacuanha*:

the drug known in medicine by that name is derived from quite a different plant and must not be confused with it. *A. tuberosa*, the Butterfly-weed, has mild purgative properties, and promotes perspiration and expectoration. *A. syriaca*, a plant misnamed, as it is a native of America and Canada, is frequently to be met with in gardens; its dull red flowers are very fragrant, and the young shoots are eaten as asparagus in Canada, where a sort of sugar is also prepared from the flowers, while the silk-like down of the seeds is employed to stuff pillows. Some of the species furnish excellent fiber, which is woven into muslins, and in certain parts of India is made into paper.

*In Hindu mythology, Soma - the Indian Bacchus- and one of the most important of the Vedic gods, is a personification of the Soma plant, A. acida, from which an intoxicating milky juice is squeezed. All the 114 hymns of the ninth book of the Rig Veda are in his praise. The preparation of the Soma juice was a very sacred ceremony and the worship of the god is very old. The true home of the plant was fabled to be in heaven, Soma being drunk by gods as well as men, and it is under its influence that Indra is related to have created the universe and fixed the earth and sky in their place. In postVedic literature, Soma is a regular name for the moon, which is regarded as being drunk by the gods and so waning, till it is filled up again by the Sun. In both the Rig Veda and Zend Avesta, Soma is the king of plants; in both, it is a medicine, which gives health, long life and removes death.*

*It is a very common roadside weed in the eastern and central states of North America, where it is called 'Silkweed,' from the silky down which surmounts the seed, being an inch or two in length, and which has been used for making hats and for stuffing beds and pillows. Attempts have been made to use it as a cotton substitute. Both in France and Russia it has had textile use. The fibers of the stem, prepared in the same manner as those of hemp and flax, furnish a very long, fine thread, of a glossy whiteness.*

*The plant is used medicinally in the United States for the anodyne properties of its root and its rhizome and root have been employed successfully, like those of A. tuberosa, both in powder and infusion, in cases of asthma and typhus fever attended with catarrh, producing expectoration and relieving cough and pain.<sup>65</sup>*

*Beneficial:*

*Every so often in our researches we come across a plant with so many uses that we wonder why it has never been commercially exploited. One such group of plant - all of them ideal for the Permaculturalist - is the Milkweeds (Asclepias species) from North America. The genus Asclepias contains over a hundred species of mainly perennial herbs growing in temperate and topical regions.*

*Virtually all parts of these plants are edible when cooked though there are reports that large quantities can cause stomach upsets. The young shoots, gathered in April-May, can be used as an asparagus substitute whilst the younger parts of old shoots can*

be cooked like spinach.

Young flower buds have a delicious pea-like flavour as do the very young seed pods (before the seed floss is produced). The flowers are used as a flavouring and a thickener in soups and were also harvested in the early morning when dew was still on them and then boiled down to make a sugary syrup. In hot weather the flowers often produce so much nectar that it forms crystalline lumps. This can either be sucked or picked off the flowers and is a real delicacy. *A. tuberosa*, as the name suggests, also produces a tuberous root and this is edible when cooked, with a nutty flavour.

All these edible qualities, though, are just one aspect of the plants uses, they have much more to offer. All the species produce a tough fiber in their stems. This can be used to make cloth, twine, etc and was traditionally harvested from the dead stems in autumn and winter, a fairly simple process. Mature seed pods contain quite large quantities of floss. This is a lovely white silky material with a number of applications. It can be used as a kapok substitute for stuffing soft toys etc, and being very water repellent, it has been used in life preservers where its buoyancy can keep a person afloat for days.

The plants also contain latex, which can be extracted and made into a good quality rubber. This latex is largely found in the leaves, is produced mainly in hot weather when grown on drier soils and is destroyed by frost. Concentrations vary and are considered to be too low for commercial exploitation. The latex has also been used as a chewing gum and regular applications are said to be a cure for warts. The seeds contain up to 20% of edible semi-drying oil. This oil can be used in making soap etc, though, since the seed is quite light, vast quantities of plants would need to be grown in order to obtain reasonable quantities of oil.<sup>66</sup>

*Pollination:*

*Milkweeds have a unique and fascinating pollination mechanism in which the plant relies on Lepidoptera (butterflies and moths) and Hymenoptera (bees, ants, and wasps) for pollination.* Hundreds of pollen grains are packaged into two connected sacs or pollinia, which is collectively referred to as the pollinarium [see SEM photo at right]. When a foraging insect lands on a flower, the pollinarium can easily attach itself to its leg. Once removed from the flower, the pollinia actually re-orient as the translator arms bend as they dry. Upon landing on another flower, the properly oriented pollinarium is deposited into a receptive stigmatic groove where the pollinia breaks down and the pollen germinates, growing pollen tubes through the stigma to the ovules in the ovary.<sup>67</sup>



<sup>60</sup> F. Roeth, R. Moomaw, A. Martin, & O. Burnside, "Velvetleaf," University of Nebraska-Lincoln Neb Guide, 10-June, 2004 <<http://ianrpubs.unl.edu/Weeds/g681.htm>>.

<sup>61</sup> "Velvetleaf," 25-June 2004, Washington State Noxious Weed Control Board, 10-June 2004 <[http://www.nwcb.wa.gov/weed\\_info/velvetleaf.html](http://www.nwcb.wa.gov/weed_info/velvetleaf.html)>.

<sup>62</sup> "Japanese Knotweed — *Polygonum cuspidatum* Sieb. & Zucc," July 1999, USDA Forest Service Pest Alert, 10-June 2004 <<http://www.fs.fed.us/na/morgantown/fhp/palerts/jknot/jknot.htm>>.

<sup>63</sup> Dr. Robert Stevenson, "Fallopia japonica (Japanese Knotweed)," 24-May 1998, University of Massachusetts at Boston, Conservation New England, 10-June 2004 <<http://site.www.umb.edu/conne/jennjim/fjaponica.html>>.

<sup>64</sup> R. Shaw, "Japanese Knotweed Alliance," 2003, CABI Bioscience International, 10-June, 2004 <[http://www.cabi-bioscience.org/html/japanese\\_knotweed\\_alliance.htm](http://www.cabi-bioscience.org/html/japanese_knotweed_alliance.htm)>.

<sup>65</sup> M. Grieve, "Asclepias," 2003, Botanical.com, 10-June, 2004 <<http://www.botanical.com/botanical/mgmh/a/ascle072.html>>.

<sup>66</sup> Rich Morris, "The Milkweeds," 14-August 1996, Plants for a Future, 10-June, 2004 <<http://www.scs.leeds.ac.uk/pfaf/milkweed.html>>.

<sup>67</sup> "Milkweed," 18-Feb. 2002, Monarch Watch, 10-June, 2004 <<http://www.MonarchWatch.org/milkweed/index.htm>>.



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