

Environmental Risk Perception, Income, and Ethnicity: Does the Netherlands Have An Environmental Justice Problem? *

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“Everything is distributed more equally in The Netherlands than in the United States.”
--A Prominent Dutch Academic

“The provinces make the decisions on the basis of the law regarding which soil contaminated spots will be cleaned up first. This is a very fair system.”
--Dutch Provincial Soil Specialist

While several scholars have examined the distribution of environmental risk in the United States, few, if any, researchers have explored how environmental justice issues are conceptualized in other countries. Environmental justice refers to “the principle that all people and communities are entitled to equal protection of environmental and public health laws and regulations” (Bullard, 1996, 493).

Generally studies in the United States indicate that ethnic and racial minority and low-income groups bear a disproportionate burden from environmental hazards than the majority population (e.g., GAO, 1983; Perfecto, 1992; Wernette and Nieves, 1992, United Church of Christ, 1987; Bryant and Mohai, 1992; Pollock and Vittas, 1995). Further, field specific and interdisciplinary discussions over the role of methodology in examining the distribution of environmental risk has occupied much of the recent environmental justice literature. These debates over measurement and methodology have left some scholars frustrated over the unwillingness of some individuals to take both quantitative and qualitative approaches to examining issues of environmental justice (Heiman, 1996).

Interestingly, similar dialogues in other countries have not been as widespread. Environmental justice, as a concept, has been rarely discussed in relation to countries other than the United States. When it has been, this concept is viewed in terms of inequities between developing and industrialized nations.

Specifically, some scholars have focused on industrialized nations willingness to “dump” their waste on developing countries that have less strict or nonexistent regulations governing these activities (e.g. Foster, 1993). What is lacking from the literature is the exploration of environmental justice in *industrialized* nations other than the United States (Davy, 1997, Agyeman and Evans, 1999). By examining other industrialized nations, researchers can deepen the scope of the literature and provide additional information and alternative ways of thinking about potential problems and solutions relating to environmental justice.

In the European and global context, The Netherlands is viewed as a more socially-conscious society than many other industrialized nations. From political, cultural, and economic standpoints, many could argue that The Netherlands is a society that emphasizes equity and has successfully provided a “safety net” for many of its citizens. In examining how environmental justice is conceptualized in another country (specifically one that is touted as a more equitable society than most), we seek to learn what variables are important in measuring environmental justice or equity and how other governments, besides the United States, view environmental justice. Specifically, we review the data available in The Netherlands regarding environmental quality and apply contemporary methodological approaches to examine the distribution of environmental risk across different income and ethnic groups.

The analysis is conducted in two stages: 1) a national analysis of 21 major towns and cities 2) a soil contamination study of the town of Enschede in the province Overijssel. In our examination, we uncover a paradoxical picture of environmental justice that ultimately suggests the need for additional data collection and both qualitative and quantitative methodologies. In terms of data, variables such as the number, location, and cleanup status of soil contaminated areas may give a clearer indication of patterns of environmental equity. Regarding methodologies, a case study approach may provide

more detailed information necessary to pinpoint the specific processes of environmental justice in The Netherlands.

Differences and Similarities Between The Netherlands and The United States Influencing Environmental Justice: Land-Use, Equity, and Environmental Policy Styles

There are several significant differences between The Netherlands and the United States that play a role in any examination of environmental justice. First, there are geographic and population differences that follow from the fact that The Netherlands has the highest population density among Western countries, with 419 people per square kilometer. This compares with 28 people per square kilometer in the United States. The Netherlands' land area is 37,000 square kilometers (excluding water) which is 0.4 percent of the United States land area. Fifteen and one-half million people live in Holland as compared with approximately 280 million in the United States (Dutch Central Bureau of Statistics, 1999; United States Census, 1999). Further, all land in The Netherlands is actively managed, developed, or cultivated (Lucardie, 1997); this differs substantially from the United States. The high Dutch population density with its consequences for land-use has effects on environmental protection, planning, and social justice.

A second difference between the United States and The Netherlands is in the area of social equity, in particular the differences among residential areas and the position of ethnic minorities.

Research has uncovered that there is a significant social stratification across neighborhoods in the Netherlands (SCP, 1998). The concept of social status in this country is operationalized in terms of education, employment and income. Research shows that the areas with the most marked decline in social status are located in large and medium-sized urban areas (50,000 inhabitants or more). They have the poorer type of housing, are considered as relatively unsafe, and residents have few ties within their neighbourhood.. In general these urban areas are characterised by high unemployment,

a large number of low-income groups and a large proportion of ethnic minority households. The Dutch government has created a special program, the mayor town policy, for urban areas (the four largest cities and 21 other municipalities, known in the Netherlands as 'G21'). This program combines urban and economic revitalization, concentrating on dilapidated urban areas. The program is funded and promoted by the national government on the basis of agreements with the cities. To receive funding the cities have to develop plans and submit these for approval to national government.

Between 1971 and 1997, the total number of ethnic minorities in the Netherlands grew from 200,000 to 1.5 million, or from 1.6 percent to 9.4 percent of the total population. These minority groups can be divided into two sections representing two distinct 'waves' of migration. The 'old' immigration countries such as Surinam, the Dutch Antilles, Turkey and Morocco form the largest single section of immigrants, approximately 70 percent of all minorities in the Netherlands; a second, more recent group, totalling 30 percent of minorities, include asylum seekers from Eastern Europe and other migrants from less developed states in Africa and Asia. Ethnic minorities in the Netherlands primarily reside in the largest urban areas and are strongly over-represented among the underprivileged of society. People of foreign origin, for example, make up around 20 percent of the unemployed, while constituting only 5 percent of the total work force. Migration has principally brought people with a poor educational background to the Netherlands, where they struggle to find economic opportunity in a technologically advanced society.

A third relevant difference from the perspective of environmental justice are differences in environmental policy styles. Attempts at coordinated, legislative efforts regarding environmental protection in both The Netherlands and the United States began since the 1970s. In both countries, public outcry led legislators and policymakers to enact environmental protection and cleanup

legislation. Many scholars characterize the Dutch policy style as being accommodationist (e.g., Lijphart, 1971; Hajer, 1995) while the American policy style can be characterized as pluralist (e.g., Dahl, 1989). The Netherlands has a highly consensus-based social structure. It has a long tradition of government consultation with various social groups, institutionalised in tripartite forums such as the Social Economic Council (*Sociaal Economische Raad*, SER) in which environmental questions are incorporated into social and economic issues. As a part of this tradition of consensus building, all relevant parties are involved in environmental policy planning. A prime aspect of Dutch environmental policy in this respect is the 'target group approach'. After a framework of national environmental objectives has been formulated in the National Environmental Policy Plans, target groups and their representatives are closely involved in all further stages of the policy process. Consultative structures between the government and the industrial organisations acting on behalf of the polluters (i.e. the target groups) are established. They define the tasks for individual industrial sectors within this framework and formalize them in covenants (agreements) and other guidelines.

Probably this culture of consensus and dialogue is an important factor to explain why environmental justice is not regularly discussed in the Dutch literature or in a policy dialogue while it is increasingly discussed in the US context where grassroots organizations have formed in protest of environmental inequities in several states in the United States from California to Georgia. There are also umbrella organizations, such as the Center for Health, Environment, and Justice (CHEJ), that connect these groups and provide information and workshops about how to organize in protest of environmental inequities. Many of these organizations and the principles of the movement have been chronicled and evaluated in academic literature [e.g. Bullard (ed.), 1996; Szasz, 1994]. At the national level, Executive Order 12898 (a presidential directive) mandates federal agencies to identify and address disproportionately adverse or high human health or environmental effects of its policies, programs,

or activities on ethnic and racial minority and low-income populations. Concerns about environmental justice are, thus, supposed to be considered in every US federal government decision. While these concerns are debated and discussed in the United States, there is no regularized discussion or inclusion of these concerns in environmental policymaking in The Netherlands. However, in both the US and the Netherlands the local level is become increasingly important in environmental policy-making. In the US context, local citizen involvement consists of EPA sponsored initiatives such as Community-Based Environmental Protection organizations and public meetings of brownfield and Superfund sites. In the Netherlands, municipalities rather than provinces now have specific tasks such as the licensing of larger and more complex industrial installations. Such powers may create possible environmental justice problems as cities are placed in a position where they must balance economic development with maintaining environmental quality.

Research Analyses

The findings of this paper are part of an ongoing research project begun in the summer of 1998. Specifically, we conducted the following research analyses:

- 1) 26 Elite Interviews [Academics, Policymakers, and Technical Experts Throughout The Netherlands such as environmental policy scholars, local environmental planners, *National Institute of Public Health and the Environment* (RIVM) officials (the Dutch Environmental Protection Agency), and soil contamination experts]
- 2) A Review of possible measures of environmental quality to assess the distribution of environmental risk
- 3) An Examination of Two Measures of Environmental Quality on a National Scale (examining major towns in The Netherlands)
- 4) A study of Soil Contamination in Enschede, located in the Province of Overijssel

Interviews

In The Netherlands, we conducted several interviews with both academics and practitioners. The majority of interviewees did not believe there was an environmental justice problem in The Netherlands, although throughout the course of the interviews several respondents seemingly unknowingly mentioned some possible cases of environmental injustice. The main purpose of the interviews, conducted throughout the country, was to determine what evidence is available to assess if there is an environmental injustice problem in the Netherlands.

In our interviews, we were interested in assessing elite level impressions of three main questions: 1) *Are there higher levels of pollution in areas or neighborhoods where minority or low-income groups reside more often than areas where other groups reside?* The majority of respondents contended that pollution was generally equally distributed across all income and ethnic groups. Some interviewees argued that if such inequality existed that this was related to historic patterns of city development rather than any discriminatory practices of the government. 2) *Do concerns about environmental justice or equity influence these land use conflicts or decision-making about the clean-up of pollution or in land-use designations (for example, in the siting of industry or waste facilities)?* The majority of respondents maintained that the concept of environmental justice or equity-especially the way these terms are conceptualized in the United States-were not issues in the Dutch context. 3) *Are Dutch regulatory agencies equally responsive to concerns about the environment of all of its citizens, including lower income and/or ethnic and racial minorities?* The majority of interviewees contended that the Dutch regulatory agencies were equally responsive to all citizens' concerns about environmental quality.

Complementing our results, the Dutch Ministry of the Environment conducted a series of interviews with key actors from social organizations and Government Ministries at the end of 1998. Some questions in these interviews asked respondents about their views on state equity and/or justice in The Netherlands. Across several dimensions (including the environmental dimension), the respondents did not view any significant levels of injustice in the design or implementation of environmental policy. Further, these key actors did not pinpoint any environmental protection inequities across income groups (Van der Wal, 1999). These opinions most likely reflect typical Dutch attitudes that their society is a socially conscious one. Even in the United States, where the majority of environmental justice research has been conducted, the debate regarding the veracity of environmental equity findings is controversial (Bullard, 1993; Been, 1994). Hence, it would appear that elite or expert opinion in this field is not entirely reliable due to the complexity of these issues making clear the need for further empirical study.

National Project and Soil Contamination Project Data: Environmental Quality, the Distribution of Environmental Risk, and Sociodemographic Indicators

We are interested in examining how decisions, policy, or law regarding the environment might be affecting low income and minority groups. As mentioned earlier, the concept of environmental justice in The Netherlands is absent from the current Dutch literature. There are no examples of how environmental justice research in The Netherlands should be shaped. In the United States, most environmental justice studies have focused on waste facility siting decisions and locations. In particular, hazardous waste facilities, incinerators, and landfills have been the foci of much of the literature. Considering that there are few of these facilities in The Netherlands (for example, there are only 12 incinerators in The Netherlands versus hundreds in the United States), the challenge was to find other ways to measure environmental quality and justice.

Through our interviews and discussions with individuals in The Netherlands, it became clear that several possible environmental quality data sources exist to explore our central research questions. Given the specific characteristics of The Netherlands and especially the high population density it was logical to think of sources of pollution in urban areas where decisions to locate, remove, clean-up, or leave situations as they are in terms of environmental effects and risk might be affecting certain groups in an unjust way. The European Union has paid some attention to potential inequities in environmental quality in highly urbanized areas in Europe. Specifically, the European Union Expert Group on the Urban Environment included a section entitled “Environmental Quality in Cities is Unequally Distributed” in their 1996 report entitled ‘European Sustainable Cities.’ In this report, the expert group maintained that “ high [population] density ... accentuates negative social and welfare effects of economic activities, such as pollution and transport. The poorest and most disadvantaged residents of cities often also live in the worst local environmental conditions, while those who can afford to will buy a better local environment elsewhere” (Chapter 5, Section 20).

Much data on environmental quality is readily available on a national level, for instance gathered by the *National Institute of Public Health and the Environment* (RIVM). But this data is often collected for other policy purpose. and has the wrong level of aggregation and does not fit with a homogenous unit of analysis. A problem we repeatedly faced was that this type of data was either not easily available on the national level or not compiled at a unit small enough to effectively explore the questions (for example, much of this data is compiled at the 40-unit grid system used by the Dutch government). An important source of information are the municipalities themselves. For several national environmental laws and funds municipalities are forced to produce self-reports. Unfortunately the level of detail and the quality of these self-reports is limited. Much information is available at the environmental departments of the bigger cities but they are not collected systematically on a national

level. A recent survey by the Dutch umbrella organization for municipalities (VNG/SGBO, January 1999) conducted in 1998 among the ‘mayor cities’ confirmed our conclusions on the availability of environmental data on the municipal level. Thus, based on our interviews, studies on the United States, European Union assessments, and availability of data we considered two sources of environmental quality measures: 1) location of industry with negative side affects and 2) noise pollution levels. Further, we also include 3) socio-demographic measures of income and ethnicity. Data were gathered from the municipalities (in alphabetic order): Almelo, Arnhem, Breda, Deventer, Dordrecht, Den Haag, Eindhoven, Enschede, Groningen, Haarlem, Hengelo, Den Bosch, Leiden, Leeuwarden, Maastricht, Nijmegen, Rotterdam, Schiedam, Tilburg, Utrecht, Venlo and Zwolle.¹

1) Location of Industry with Negative Side Affects

¹No data could be used from Amsterdam, Helmond, and Heerlen due to the inconsistencies in the data as compared with other municipalities.

Much of Dutch policymaking is implemented at the local level; land use planning is largely conducted at the municipal level. Planning areas are defined and agreed upon by affected municipalities. Within this land-use system, the kind of activities which are allowed in the different parts of the planning area are defined by documents which define (a) a list of types and numbers of companies allowed and (b) zoning ordinances. Through the combination of company list and zoning ordinance, the land-use plan specifies whether or not a certain type of business activity is allowed in the plan area. Further, this plan regulates how close each type of industry can be to other land uses (e.g., residential). Due to the scarcity of land in the Netherlands, industrial sites still exist in residential areas. Most municipalities rank businesses by category with higher number categories providing the most environmental risk.²

2) Noise Pollution Levels

The respondents in our interviews frequently discussed differences in noise pollution levels. In recent years, this has been an item of much public debate in The Netherlands. Much of this discussion has focused on the flight patterns of planes landing at Schiphol airport (the major Dutch airport located outside Amsterdam) and the citing of the tracks of the new Betuwe railway track to Germany and the High speed railway to Belgium. High density population that makes it difficult to avoid crossing residential areas while developing new flight patterns and building new railway tracks. Other debates have focused on traffic patterns in cities. From 1987 onwards all cities had to make an inventory a list of the house fronts that had noise levels that measured above 60 decibels (a so called “A List”). Basically noise problems can be solved by reducing the traffic, for instance by redirecting traffic into

² There is no standard ranking system across all municipalities, but most follow either the ranking system of I to IV or I to VI. In the first case, the industries posing the most significant environmental risk are Category IV and, in the second, Categories IV, V, and VI.

other streets, through so-called traffic plans and by isolating houses with for instance double glass windows. A potential environmental injustice problem is there with the houses not isolated yet. The idea that people from lower income groups can not afford to move away from noise pollution or even have to decide to move towards noise pollution because of the lower rents raises an environmental justice issue.

3) Socio-demographic Data

The Central Bureau of Statistics (CBS) has compiled socio-demographic data on the neighborhood level. These neighborhoods were designed by the CBS to provide a smaller unit than four-digit postal zip code data for researchers and government planners. For instance, in the municipality Enschede there are 63 neighborhoods and 9 postal codes areas. The neighborhoods are designed to be more homogenous types of areas in housing and socio-demographic data. The CBS data provides us with income level (we use average individual income) and percentage of individuals from abroad or *allochtonen* (this is defined as non-native or foreigner which include individuals from Turkey, Morocco, Surinam, and the Dutch Antilles).

National scale (Mayor Towns)

To examine the relationships between measures of environmental quality, income, and ethnicity, we utilize multivariate statistical analysis. This analysis raises many issues that are also presently debated in the environmental justice literature in the United States. It appears, from the analysis presented here, that the phenomena of environmental justice (measured by the relationships between income levels, percentage minority, and the distribution of polluting industry and high noise areas) is not present in Dutch urban areas. While this evidence does not provide any statistically significant findings, it does raise the question: are the typical methodologies used in the majority of

environmental justice literature appropriate to examine the complexities involved with the distribution of environmental risk? Tables I and II report these findings.

Table I: Linear Regression Estimates of Number of High Pollutant Industries and CBS Neighborhood Income and Ethnicity

	Dependent Variable: Number of High Pollutant Industries
Average Income Per Individual	5.976E-06 (.000)
Percentage Non-Western Ethnic Minority	1.387E-03 (.003)
Constant	.115 (.164)
N	1003 [^]

Note: Cell Entries are OLS Regression Coefficients, with Standard Errors in Parentheses.

* Adjusted R²: .001

[^] 412 cases were not used due to missing CBS data.

Table II: Logistic Regression Estimates of the CBS Neighborhoods with Households with Greater than 67 Decibels Noise Level

	Dependent Variable: Neighborhoods with Housefronts with Greater than 67 Decibels Noise Level#
Average Income Per Individual	-1.7E-05 (3.331E-05)
Percentage Non-Western Ethnic	-.0015

Minority	(.0127)
Constant	-1.9774 (.7306)
N	1003^

Note: Cell Entries are Logit Coefficients, with Standard Errors in Parentheses.

* Percent of Cases Predicted Correctly: 91.13%

Dependent Variable coded as follows: 1= Neighborhood Household(s) with Greater than 67 Decibels Noise Level; 0 = Neighborhood Does Not Have Household(s) with Greater than 67 Decibels Noise Level.

^ 412 cases were not used due to missing CBS data.

As reported in Table I, neither the CBS measure of income, average income per individual, or percentage non-western ethnic minority has any predictive power in explaining the variation in the number of high pollutant industries (either Category IV on a scale of I to IV or Categories IV, V or VI on a scale of I to VI). Based on research conducted in other industrialized countries such as the United States, we expected for their to be statistically significant relationships between income and/or ethnicity and the numbers of high pollutant industries. From the analysis of the distribution of these highly polluting industries, there does not seem to be inequity in the placement of these businesses.

Further, as reported in Table II, little, if any, of the variation in another measure of environmental quality is explained by our measures of income and ethnicity. Based on our interviews with elites in The Netherlands, noise pollution was mentioned often as one of the most significant concerns raised by citizens. In the Netherlands, local planners are largely responsible for designing the traffic routes (and thus in some ways control the levels of noise pollution in a city). Our measure of noise pollution, neighborhoods with housefronts greater than 67 decibels noise level, reflects this local-level decision-making. Thus, based on both regression analyses, we *could* argue that there is not an environmental equity problem in The Netherlands regarding the distribution of high pollutant industries and noise

pollution.

However, we question the validity of these findings in the Dutch context given that in the American situation researchers studying environmental risk distribution have uncovered that “the story of environmental justice ... is more complicated than simple correlations between race, income, and toxic exposures” (Cutter and Solecki, 1996). Thus, perhaps in The Netherlands the use of these quantitative measures may not similarly be adequate to pinpoint processes by which environmental injustice occurs. In effect, we decided to examine another aspect of environmental policymaking.

The Enschede Soil Contamination Study

Some studies in the U.S. have found that ‘superfund’ or hazardous waste sites are cleaned up more quickly in white, higher-income neighborhoods than in minority or low-income neighborhoods (Lavelle and Coyle, 1992; Heiman, 1996). In the Dutch case, we concluded that areas with soil contamination or other types of pollution might be cleaned up more quickly in higher income and/or higher education areas or areas with fewer numbers of minorities. If so, this could indicate a significant environment inequity. In The Netherlands, sites that must be cleaned up and according to what priority is given by soil contamination standards in national law beginning in 1980. Current estimates of the number of these sites in The Netherlands as a whole is 500,000, but approximately 20 to 30 percent of those sites require cleanup (Ministry of Housing, Spatial Planning and the Environment, 1997). In practice, environmental standards are not the only arguments in the priority of clean up operations. Provinces have a certain discretion in decision making. This can be influenced by collective action of citizens living in certain areas or by financial-economic consideration for instance in the possibilities to redevelop residential areas. Another indicator that could be important in determining if there higher levels of pollution in areas or neighborhoods where minority or low-

income groups reside is the presence of soil contamination in residential areas. Soil contamination standards in Dutch national law are based on cumulation of toxic substances in the soil who limit the multi-functional use of land or even treated the further environment (groundwater pollution) or present risk for human health. Since the end of the sixties, there have been enormous efforts to inventory and clean up contaminated land.

We explored the distribution of soil contamination sites in Enschede located in the province of Overijssel, The Netherlands. Enschede is not only one of the G21 municipalities, but also one the poorest with a relatively low average household income and some of the most declined neighborhoods in the Netherlands. In Enschede, we examine the distribution of soil contamination and the cleanup status of each inventoried site.

Table III: Linear Regression Estimates of Number of Contaminated Soil Sites and CBS Neighborhood Income and Ethnicity

	Dependent Variable: Number of Contaminated Soil Sites
Average Income Per Individual	-2.431E-04 (.000)
Percentage Non-Western Ethnic Minority	-.275 (.205)
Constant	11.963 (5.325)**
N of Neighborhoods	63

Note: Cell Entries are OLS Regression Coefficients, with Standard Errors in Parentheses.

* Adjusted R2: .005

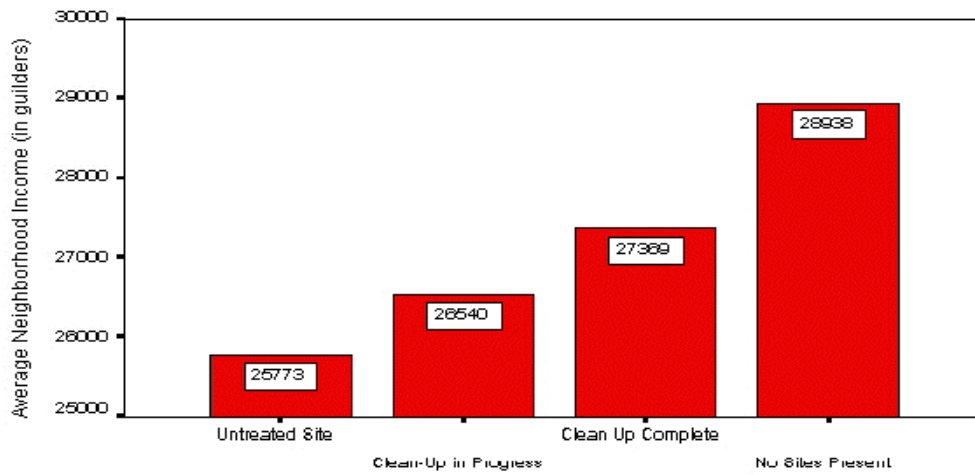
** P<.05

As reported in Table III, there are no statistically significant relationships at the $P < .05$ level between the number of contaminated soil sites and average income per individual or percentage non-western ethnic minority, but both independent variables have relationships that approach significance in explaining the variation in the number of contaminated soil sites ($P < .2$). The signs of the coefficients indicate that as income increases, the number of contaminated soil sites in a neighborhood decreases. Interestingly, a negative relationship between percentage non-western ethnic minority and this same measure of environmental quality indicates that as the ethnic minority population increases, the number of soil contaminated sites decreases. There are at least two plausible explanations for this finding: 1) public policy in The Netherlands may have a pervasive impact upon the protection of these minorities in regards to contaminated soil sites or 2) minorities may be concentrated in the city center which is less likely to have contaminated soil site areas since industry is unlikely to locate there. After this exploration by neighborhood, we questioned whether these arbitrary boundaries provide the best units to examine these relationships. Further, we looked to research by Kees Aarts (1987) that indicates that in The Netherlands, the more political action communities take, the more likely government is to follow through on demands to cleanup soil contamination. Thus, a more accurate approach to examine environmental equity may be the clean-up status of each inventoried soil contamination site. The municipality of Enschede provided us with a database that indicates the status of a site in the following manner: 1 = identified soil contamination site; 2 = cleanup of the soil contamination site has begun; 3 = cleanup of the soil contamination site has been completed.

In Figure 1, we compare the mean income level of site status (see next page). From this analysis, we can deduce that richer neighborhoods are less likely to have areas of soil contamination in Enschede. Further, richer neighborhoods are likely to have their soil contamination areas cleaned-up more often than lower income neighborhoods. As indicated by the linearity F Test, the differences in the mean

income levels by soil site status is significant at the .001 level. We also examine the predictive power of income and ethnicity on soil site status through logistic regression. The results of this analysis is reported in Table IV.

Site Status by Mean Income
In Enschede, The Netherlands



Soil Contamination Site Status

Source: Income, CBS Data; Site Status, Dutch Provincial Authorities

*Linearity F Test 10.375, Significance .001

Table IV: Logistic Regression Estimates of Soil Site Status and Neighborhood Income and Ethnicity*

	Dependent Variable: Status of Soil Contamination#
Average Income Per Individual	8.55E-05 (4.822E-05)**
Percentage Non-Western Ethnic Minority	-1.3898 (4.9051)

Constant	-2.5334 (1.4088)**
N of Sites	257^

Note: Cell Entries are Logit Coefficients, with Standard Errors in Parentheses.

* Percent of Cases Predicted Correctly: 58.75%

Dependent Variable coded as follows: 1= Site Cleaned or No Contamination Present; 0=Site Not Cleaned.

^ 31 cases not incorporated due to missing data.

** P<.08

By examining the income and ethnic composition around contaminated sites, we can assess the significance of these variables for the clean up status of the sites. We view the clean up of a site as a measure of environmental quality (i.e., a cleaned up area is less risky) as well as a measure of governmental responsiveness or action (i.e., has the government taken steps to protect individuals exposed?). The percentage non-western ethnic minority is negatively associated with the clean-up status of sites, but this relationship is not statistically significant. As income rises, the clean up status of the site is more likely to be cleaned. This positive relationship between the cleanup status of the site and average income per individual is statistically significant at the P<.08 level. What is important to consider from this model is the choices made by regulators and policymakers in regards to the cleanup of soil contamination. Potentially, in Enschede, those whom are politically active may receive more prompt government attention (Aarts, 1987)-in this case, the more active may be the wealthier populations.

The findings presented in Figure I and Table IV provide some evidence that income levels may be important in explaining whether or not government takes action to clean up a contaminated soil site.

While in our national level analysis, we find no statistically significant relationships between measures of environmental quality and ethnicity or income, in one mid-size municipality we do find some evidence of potential environmental justice regarding what may be a better indicator of environmental equity. Thus, this study of soil contamination status provides us with some insight into the vagaries of statistical analyses, the differences in measures of environmental quality, and a starting

point for further study of these issues across the whole of The Netherlands.

Conclusion

Environmental injustice, as we conceptualized it in our analysis, is largely absent in the cities of The Netherlands examined. Are these findings accurately representing the distribution of environmental risk across The Netherlands or does the methodological constraints of our initial approach mask deeper issues such as those discussed in the American context? (Heiman, 1996) In particular, can environmental inequities be identified by simply examining the statistical relationships between ethnicity, income, and environmental risks or as some researchers in the United States maintain, perhaps environmental injustice “... is a narrative that must be examined within the context of the underlying sociospatial processes that gave rise to the production of ... toxic releases [or other types of pollution] that created the riskscape” (Cutter and Solecki, 1996, 395). In other words, we need research that combines an examination of the history of land-use decisions that lead to contamination and the distribution of environmental risk with an in-depth case study approach of the contemporary ‘riskscape.’

Recent literature on environmental justice in the United States makes the case that “environmental justice demands more than mere exposure equity. It must incorporate democratic participation in the production decision itself” (Heiman, 1996, 114). Thus, a more detailed exploration of the processes by which environmental decision-making is conducted in The Netherlands may shed light on how environmental justice is conceptualized in the country and the complexities involved with levels and types of political participation in terms of equitable environmental present and future outcomes.

In conclusion, our future research will explore the distribution of soil contamination and the clean-up

of these sites across The Netherlands. Further, we will apply the lessons learned here to choose a series of case studies to explore the underlying processes of environmental procedures to evaluate the Dutch 'riskscape.' In so doing, we will be able to pinpoint the levels of participation that affected citizens have engaged in to address their environmental situation thus clarifying issues of environmental justice. Such work can then be compared to research in the United States to more fully comprehend the complexities of environmental equity across industrialized nations.

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