Residents’ perceptions of coal industry long-term pollution in the Jiu Middle Valley (Romania): premise for environmental education

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Abstract

In Europe, the Romanian Middle Jiu River Valley remains a well-known coal basin in active exploitation. Near the surface coal exploitations are found the two Thermo-Electric Power Plants (TEPP) Rovinari and Turceni surrounded by toxic ash waste dumps of different ages. This paper is based on a survey of 223 participants conducted in the above mentioned TEPP and highlights specific characteristics of living in the Middle Jiu Valley. Using a 127-item questionnaire we have analyzed the contextual link between coal mining pollution perceptions, educational level, predictive behaviors and related environmental education.

Keywords: pollution perception, coal mining, environmental education, Middle Jiu Valley - Romania;

1. Introduction

Even if in the last years the public, researchers, policy makers and environmental educators began paying more attention to problems like acid rains global warming and pesticides, issues like mining-contaminated sites and affected communities at risk should remain important issues on their agenda. Extractive and thermo-energetic industries are polluting industries that release carcinogenic substances such as radio nuclides and heavy metals in the environment. A very recent research has identified a significant increase in radio nuclides and heavy metals in our analyzed environment: “The highest radioactivity was presented by Th-234, Pb-214, Ra-226, Bi-214 [...] Ra-226 is accumulated in bones and its gaseous decay products are accumulated in soft tissues, inducing lung cancer in time” (Corneanu, M., Corneanu, G., Cojocaru, L. & Gamaneci, G., 2009, p. 239). The detrimental human health impact of these substances depends on the pollutant toxicity, the concentration, exposure radiation and previous health dynamic of involved persons. Although there is a relatively large amount of recent international studies regarding the consequences of pollution on human health, effects on plants, measuring techniques and methods of control,

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very few researchers dedicate themselves entirely to study the behavioral response to pollution. Yet our recent period of time has seen an increased research interest in the risk of perception, a risk that plays a central role in both risk awareness and risk communication strategies. In low income communities, the complex interaction between poverty and limited sustainable development capacities often leads to a critical situation in implementing proper environmental education.

2. Research methodology

Our study put into discussion the influence of residents’ educational level on their perceptions regarding pollution. We also looked for the significant factors influencing people opinions and declared intentions related to the “solution” of moving to another habitat. The study included 223 adults from age 18-75 covering the rural areas of Middle Jiu Valley - Romania, participants in a survey of late 2010. They answered a 127-item questionnaire (POLMEDJIU Inventory), covering perceptions about coal mining pollution (air, water and land) and its consequences (including human, animal and vegetal health status), proposed or adopted mitigation pollution’s measures, economical level and perceived quality of life. The questionnaire was carried out on households’ owners in the selected villages within the valley to discover the residents’ perceptions regarding different aspects of pollution. A systematically selected sample was used, every 10th household being addressed.

3. Findings and discussions

3.1. Sample description

Relevant aspects for our study are summarized in Table 1.

| Characteristics                        | Value       |
|----------------------------------------|-------------|
| **Education**                          |             |
| N = 209                                |             |
| Primary school                         | 9 (4.3%)    |
| Secondary school                       | 11 (5.2%)   |
| High school and professional school    | 151 (72.2%) |
| Post high school and higher education  | 38 (18.1%)  |
| **Occupation**                         |             |
| N = 219                                |             |
| Private farmer                         | 3 (1.3%)    |
| Employed farmer                        | 3 (1.3%)    |
| Industrial employee                    | 115 (52.5%) |
| Services employee                      | 34 (15.5%)  |
| Unemployed                             | 16 (7.3%)   |
| Business man/woman                     | 1 (0.4%)    |
| Renter                                 | 47 (21.4%)  |
3.2. Pollution realities perceptions

148 persons (70.8%) declared a perceived medium/higher air pollution level vs. 61 respondents (29.2%) who consider benefiting from a low or very low polluted air.

While, by our results, personal educational level doesn’t seem to influence general pollution perceptions ($r = 0.117$, $p = 0.054$, $N = 189$), perception of air pollution do seem to be related ($r = 0.155$, $p = 0.015$, $N =197$). These statistical values require some caution in interpreting the effect of educational level in both above mentioned analyzed perceptions. Taking these results into account, we have to remark that more than a half of our respondents (52.5%) seem to be the industrial workers of the two TEPPs. A possible explanation of our findings consists in the fact that 72.2% of our respondents have similar educational level and consequently related awareness and exposure to the risk communication messages. In trying to integrate these results, we shall keep in mind that environmental perceptions are especially determined from the sensory experience (i.e., if one cannot see or smell pollutants then they must not be present). But also that: “People who are accustomed to relatively poor air quality may be less sensitive to further degradation of air quality” (Saksena, S., 2007, p. 7). We shall also consider the German sociologist Beck’s thesis of risk society that described a psychological paradox: “The possibility of denying and trivializing the danger grows with its extent” (Beck, U., 1992, p. 75).

In the people’s opinions, communities’ initiatives were also badly represented (Table 2).

| Answer            | %   | N  |
|-------------------|-----|----|
| Yes               | 9%  | 20 |
| No                | 63.2% | 141 |
| I don’t know      | 27.8% | 62 |

3.3. From pollution awareness to ‘radical coping strategies’?

25 respondents (11.2%) are seriously considering moving to another location, 40 of them (17.9%) declared that the inconvenience of relocating would stop them from pursuing the matter, 120 persons (53.8%) do not take at all the idea into consideration, and 38 respondents (17%) were not able to give a proper answer. Using bivariate analysis and binomial regressions, we have been able to anticipate people’s most perceived threats leading to the idea of household relocation (Table 3).

| Threat                        | Wald | p-value | OR     | 95% C.I.       |
|-------------------------------|------|---------|--------|----------------|
| Floods                        | 6.197| 0.013   | 0.150  | 0.034-0.668    |
| Air pollution                 | 6.127| 0.013   | 0.185  | 0.049-0.704    |
| Personal health status        | 5.246| 0.022   | 0.046  | 0.003-0.641    |
| Possible damage of construction | 4.786| 0.029 | 0.107  | 0.015-0.793    |
| Reduction of arable land      | 3.959| 0.047   | 0.130  | 0.017-0.970    |
The developed regression models show that floods and air pollution are the main threats leading to the idea of household relocation as a “solving” means of avoiding pollution, followed by personal health status, possible damage of construction and the reduction of arable land (N = 223). Home location also has a certain importance. Our path analyses suggest that perceived pollution and its main consecutive threats play important roles in understanding and predicting environmentally attitudes and beliefs. In the same time, we highlighted that people’s environmental risk perception is a function of a broad orchestration of explanatory factors.

4. Conclusions and recommendations for the environmental education

The coal-mining industry from the Middle Jiu Valley of Romania represents a major environmental health threat. In the analyzed area educational environmental education should represent a fundamental need. Beyond the respondent’s educational level, analyzing pollution perceptions need to take into discussion not only the respondents’ mental models (i.e. personal life experience, local memory of community member), but also significant realities such as proximity to pollution sources, community awareness and specific vulnerability factors. To achieve these qualitative approaches, longitudinal studies and experiences-based learning programmes should be conducted. In Figure 1 we summarized the most significant factors to be considered when approaching environmental pollution analyzes.

In Romania, only a few environmental bodies struggle to engage with the various public understanding and perceptions in the specific context of high industrial pollution. No doubt, environmental issues are moral civil, socio-political, educational and medical issues, requiring the discourse of all citizens. According to the Aarhus Convention, a proper environmental education shall consider as pillars: the access to information, the public participation in decision making and the access to justice. As one example, school curricula should address environmental issues. United-Nations Secretary-General Kofi Annan (1907-2006) consider the Convention on Access to Information, Public Participation in Decision-making and access to Justice in Environmental Matters (usually known as Aarhus Convention): “the most ambitious venture in the area of environmental democracy so far.
undertaken under the Auspices of the United Nations” (Aarhus Convention, 2001). In high-polluted areas, environmental solidarity actions will improve residents’ everyday lives by promoting environmental protection along with economic development.

5. Limitations

We shall consider that some errors based on self-reported behaviors might have been generated.

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