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The weight of building materials in the social metabolism of Spain and conflicts on quarries

Keywords: quarries, natural resources, social metabolism, material flow analysis, environmental conflicts, dematerialization

This paper reviews recent trends on resource use in the Spanish building industry based on the *social metabolism* approach (Fischer-Kowalski, 1998). The growth of the Spanish economy from 1980 to 2007 was based on an intensive use of natural resources, and the material intensity of output did not decline in that period in contrast to the period after 2008. This Knowledge Unit also provides evidence of one specific type of resource extraction conflict in Catalonia.

1 Introduction

For thirty years and until 2007, Spain witnessed remarkable Gross Domestic Product growth based to a great extent on the building sector resulting in an intensive use of building minerals and extensive soil sealing. The final debt-fuelled building boom of 2002-2007 proved to be financially non viable. It was also environmentally costly. The country now suffers a long lasting crisis burdened by private and public debts, facing a large stock of unsold dwellings and oversized infrastructures.

This paper reviews recent trends on resource use in Spain based on the *social metabolism* approach (Fischer-Kowalski, 1998). Material Flow Analysis (MFA) stands up as an international agreed methodology that allows an empirical assessment of the physical dimension of an economic system, by accounting for all its material inputs and outputs.

It was easy in Spain for the financial system to increase mortgages and other debts (private or public), and to mistake this expansion of credit for the creation of real wealth. Interest rates were low after Spain joined the euro in 2000. After the crisis, the obligation to pay the mountain of growing debts can be fulfilled by squeezing the debtors for a while. Other means of paying the debt would be either inflation (debasement of the value of money), or economic growth - which is falsely measured because it is based on undervalued exhaustible resources and unvalued pollution (Soddy, 1926).

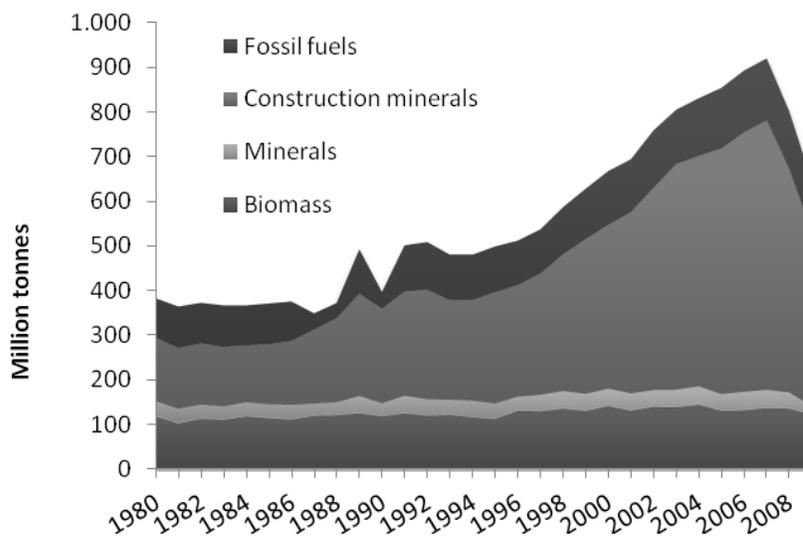
Returning to “debt-fuelled growth” after 2009 became financially impossible, as banks are loaded with “toxic assets” and therefore reluctant to lend. In any case, growth is not really “fuelled” by debt and money. It is prosaically fuelled by coal, oil and gas. The fossil fuels are not produced within the economy; they were geologically produced a long time ago.

The growing extraction and use of materials are at the roots of increasing ecological distribution conflicts.

2 The effects of the economic crisis on material use in Spain

In the Spanish strong economic growth from 1980 to 2007, the Domestic Material Consumption (local extraction plus imports minus exports) grew faster than GDP, building minerals being the main item in the economy (Fig. 1). In 2006, when construction activities were reaching their peak, 66 per cent (in weight) of all DMC were construction minerals (stones, sand and gravel). Given their low price per unit of weight, they tend not to be transported long distances but extracted locally.

Figure 1. Spain: Domestic Material Consumption Composition (2000-2009)



Source: Cañellas, et al. (2004), González-Martínez et al. (2010) and own estimations.

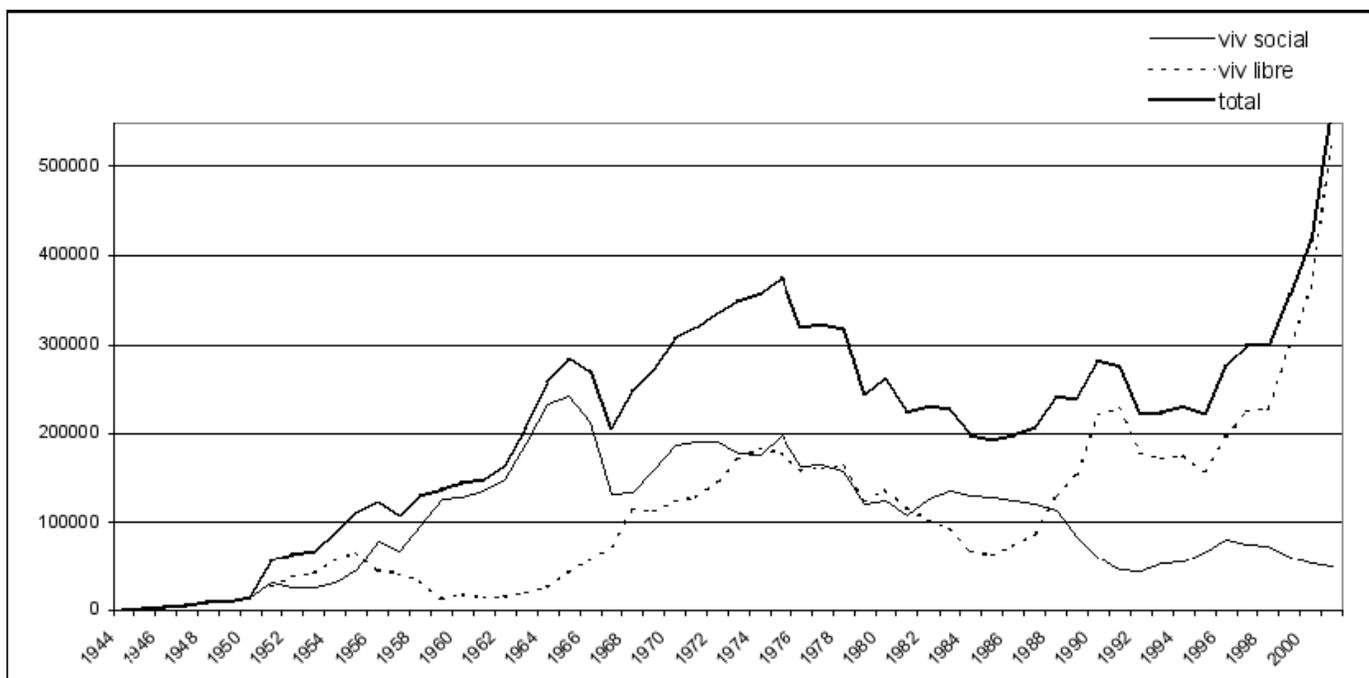
Spain was near the top on material use intensity in Europe until 2007, when material consumption per capita reached its peak with 20.1 ton per habitant; far above from the 16.5 tons EU-27 average material consumption that year (Eurostat, 2011). Impacted by the global economic crisis, real GDP in 2008 grew only 0.86%, and in 2009, for the first time in 16 years, GDP growth rate was negative (-3.7%). The effects of the crisis were reflected strongly on material extraction as it dropped 13.9% and 18.2%, in 2008 and 2009, respectively. Likewise, domestic material consumption shrank 9.2% and 18.1% in the same years. As for per capita levels, for the first time domestic consumption dropped below the European average and below the levels observed in the early 1990s: 14 ton per capita in 2009. GDP stagnated in 2010 and 2011, and will decline again in 2012 (because of self-inflicted austerity measures to pay off the debts). Material use is declining faster than GDP.

3 Conflicts related to the construction minerals in Spain: quarrying activities in Catalonia

Studies of material flows have focused on the level and changing patterns of their use, and also on the trends toward relative “dematerialization” (compared to GDP trends). Material flows, together with energy flows and the HANPP (human appropriation of net primary production of biomass), are indicators that signal different states in socio-ecological transitions. In the case of Spain we may be witnessing a structural, permanent change in some of such patterns (the decline of the building materials in total material flows, the definitive reversal in the growth of MF per capita) and the persistence of other patterns (a large surplus of physical imports over exports).

Pressures exerted on the environment due to extractive activities can give rise to ecological conflicts. Construction materials exert different environmental and social pressures if we consider the different stages of their “life cycle”, which could be divided into five categories: extraction, transport, processing, construction and final disposal. First, conflicts can arise in quarries due to extraction of building materials and its related impacts. Mining is related to diverse potential environmental and health pressures, such as impacts in surface water and groundwater, noise, dust, biodiversity, deforestation, soil and landscape changes (EPA, 2004). Second, transport of extracted materials to processing plants and then to the construction sites relates to noise, dust and air pollution. Third, processing plants where cement and other construction inputs are produced requires energy, water, chemical substances and can also affect the quality of soil, air, surface and underground waters. Fourth, construction of buildings and transport infra-structures have also been related to conflict when impacting on areas of high biodiversity and landscape value. Fifth, final disposal of buildings and infrastructure materials, as well as of waste generated during the different stages of the life cycle in landfills, relates to environmental and health pressures (water, air and soil pollution). The building boom in Spain (in terms of dwellings only, not infrastructures, in the 2000s) is shown in Fig. 2, which also shows the relative decline in public-owned housing.

Figure 2 Dwellings construction in Spain from 1944 to 2007



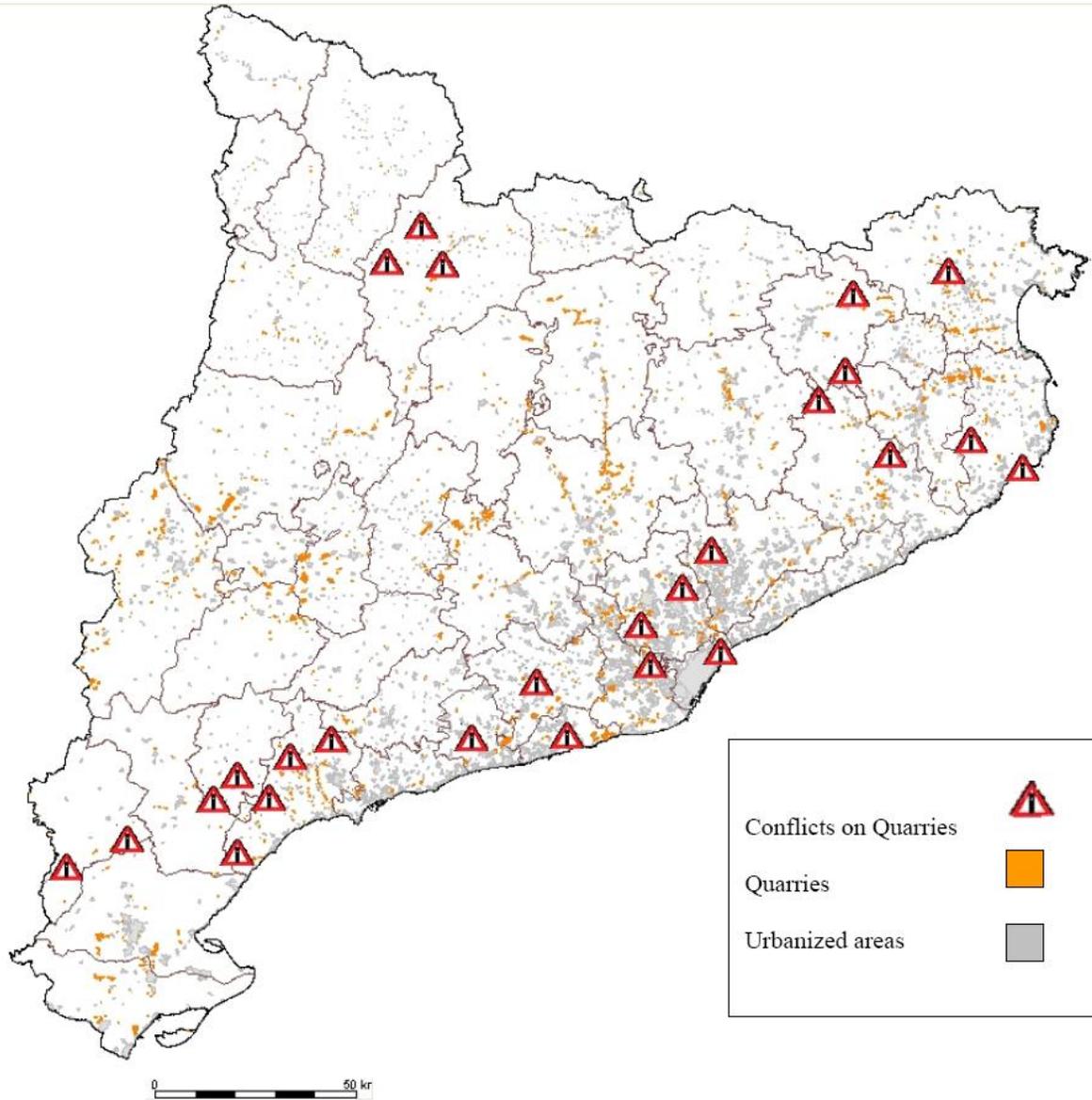
We shall focus now on Catalonia. According to the Spanish association of “aggregates” (*áridos*) (ANEFA), Catalonia is the second Spanish community -after Andalusia- in terms of the number of active quarries (250 still in 2010) (ANEFA, 2010). Aggregates are the main component of cement and other construction inputs. Population density in Catalonia (210 inhabitants per sq.km) is more than double that of Spain as a whole, and also more than double than in Andalusia. Hence, Catalonia is one of the regions under heaviest pressure in Spain in terms of quarrying and construction. Moreover, Catalonia has more information available for the analysis of conflicts than others. In fact, an observatory of projects affecting the territory (*Observatori de projectes i debats territorials de Catalunya*) was launched in 2003 by the regional government and regional and local newspapers register a wide range of conflicts related to quarrying activities.

In Fig 3 we show a map with the main conflicts on quarrying in Catalonia since the 1990s. There are two main types of conflicts on quarries. In one, the conflicts arise because new quarries are opened or, often, they are reopened or expanded after a long period of inactivity driven by the building boom or infrastructures expansion (high speed train, roads). In the other type, the conflict arises when there are proposals to place municipal waste as refilling material in disused quarries which are supposed to have a rehabilitation plan. In the first category we find conflicts in different areas of Catalonia, for instance in the Alt Empordá (coastal northern areas) or in the Baix Penedés (south west of Barcelona). In the Empordá, since the mid 2000s, a strong citizens’ movement started against the new quarries aimed for the High Speed Train connecting Barcelona with France and the expansion of provincial and national highways (N-II, A-26). Similar conflicts are found in the surrounding counties. These areas have old quarries opened during the 1970s when population densities were lower. Increasing extraction pressures are mobilizing local inhabitants that have struggled against these extractive activities for a decade.

In the second category, we find conflicts related to the closure of old and abandoned quarries. Examples can be found in quarrying areas that have been engulfed by the conurbation of Barcelona. There, the opening of new quarries is not easy. However, given the increasing problem regarding opening of landfills and incinerators, old quarries are being fostered as the solution for the disposal of urban waste. Recycling companies and local governments are proposing the use of the “inert fraction” of recycling plants (e.g. highly compressed waste with low organic matter) to refill old quarries. Citizens organizations are concerned by the leakages and pollution risks related to this filling method. Catalonia has hundreds of closed and abandoned quarries and there are many conflicts in the region demanding remediation (e.g. Garrotxa, Girona), protection against legal or illegal waste dumping (e.g. Terra Alta, Tarragona).

Which are the driving forces of such conflicts? At the more general level, as explained above, the extraordinary building materials intensity of the Spanish economy until the crisis of 2008, an anomaly compared to other large European economies. There are also some more specific causes or concomitant factors. For instance, in areas with very high population density such as Barcelona and its conurbation, there are no large quarries since they would impinge on the built environment or protected areas. However, there are some conflicts of the second type (closing down of disused quarries, as in El Papiol).

Figure 3 Map of quarrying conflicts in Catalonia. Source: own elaboration



4 References

Scientific References

- Cañellas, S., A. C. Gonzalez, I. Puig, D. Russi, C. Sendra, and A. Sojo, 2004. Material flow accounting of Spain. *International Journal of Global Environmental Issues* 4, 229-239.
- González-Martínez, A.C., Cañellas, S., Puig, I., Russi, D., Sendra, C., Sojo, A., 2010. El flujo de materiales y el desarrollo económico en España: Un análisis sobre desmaterialización 1980-2004. *Revista Iberoamericana de Economía Ecológica* 14, 33-55.
- Martínez-Alier, J., Kallis, G. Veuthey, S Walter, M Temper, L. Social Metabolism, 2010 *Ecological Distribution Conflicts, and Valuation Languages, Ecological Economics*, 70 (2), 153-158.
- Soddy, F. 1926, *Wealth, Virtual Wealth and Debt. The solution of the economic paradox*, George Allen & Unwin, London.
- Vallejo, M. C., Pérez Rincón, M. A. and Martínez-Alier, J., 2011. Metabolic Profile of the Colombian Economy from 1970 to 2007. *Journal of Industrial Ecology* 15, 245–267.
- Carpintero, O., 2005. *El metabolismo de la economía española: Recursos naturales y huella ecológica (1955-2000)*. Fundación César Manrique.

Other Documents

National

- Consejo Superior de Cámaras de Comercio, Industria y Navegación de España (Cámaras), 2011. Base de Datos de Comercio Exterior. <http://aduanas.cameras.org/>. [Accessed November 16, 2011].
- Fischer-Kowalski, M., 1998. Society's Metabolism. *Journal of Industrial Ecology*, 2:61–78.
- Instituto Nacional de Estadística (INE), 2011a. Economía. Comercio Exterior. <http://www.ine.es/jaxi/tabla.do> [Accessed March 7, 2011].
- Instituto Nacional de Estadística (INE), 2011b. Estadísticas de la construcción. www.ine.es [Accessed June 24, 2011].
- Ministerio de Industria, Turismo y Comercio (MITyC), 2011a. Estadística Minera. <http://www.minetur.gob.es/ENERGIA/MINERIA/ESTADISTICA/Paginas/Consulta.aspx> [Accessed April 4, 2011].
- Ministerio de Industria, Turismo y Comercio (MITyC), 2011b. Estadísticas y Balances Energéticos. Publicaciones balances energéticos. <http://www.minetur.gob.es/energia/balances/Balances/Paginas/Balances.aspx> [Accessed April 7, 2011].



Ministerio del Medio Ambiente y Medio Rural Marino (MARM), 2011. Boletín Mensual Estadístico.

Page 7

<http://www.marm.es/es/estadistica/temas/estad-publicaciones/boletin-mensual/default.aspx>
[Accessed April 3, 2011].

EU

Eurostat, 2001. Economy-wide material flow accounts and derived indicators: A methodological guide. Luxembourg: Office for Official Publications of the European Communities.

Eurostat, 2011. Material Flow Accounts.
<http://appsso.eurostat.ec.europa.eu/nui/setupModifyTableLayout.do> [Accessed 30/06/2011].

International

Food and Agriculture Organization (FAO), 2011. FAOSTAT Database. FAO, Rome.
<http://faostat.fao.org/default.aspx> [Accessed March 20, 2011].

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