Chapter 27 Soil in Comic Strips and Cartoons

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27.1 Introduction

Soil is a part of our daily lives by virtue of the role it plays in our environment, and by its position at the interface between the atmosphere, hydrosphere, biosphere and lithosphere. Consequently, soil appears in all the artistic fields, including comic strips and cartoons. Comic strips are scripted stories told in images. A comic strip is a means of communication that lies at the interface of graphic art, cinematographic art, and literature. From graphic art, it borrows the composition of the images, and the variations of shading and light, perspective and color. From cinematographic art, it borrows the script, the framing or the angles of sight, and the sequence of the images. From literature, it borrows the texts and the dialogues.

Such stories in images appeared in Europe in the first half of the 19th century. Among the pioneers were "Histoire de M. Jabot" (Töpffer 1833), "Max und Morizt" (Busch 1865) and "La famille Fenouillard" (Colomb 1889; pseudonym: "Christophe"). Primarily humorous, the comic strip became more serious in the United States, with "The Yellow Kid" (Outcault 1896) and "The Katzenjammer Kids" (Dirks 1897). Later, it moved to include fantasy themes, e.g., "Little Nemo in Slumberland" (McCay 1905). During the 1930s, American comic strips grew in popularity as daily features in newspapers, and Superman and Mickey Mouse (1934) became household names. The comic strip remained focused on the child audience for a long time. Its mission was to divert them. Since its birth, the comic strip has been evolving from its early, narrow focus on entertaining children with tales of humour and adventure, to more adult themes in the 1970s and 1980s. By the end of the 1990s, almost all literary styles had been explored (detective story, thriller, fiction, history, humour, heroic fantasy, etc.).

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In modern print media, a cartoon is a piece of art, usually humorous in intent. This usage dates from 1843 when *Punch* magazine applied the term to satirical drawings in its pages, particularly sketches by John Leech (Mayhew and Landells 1843). Modern gag cartoons, found in magazines and newspapers, generally consist of a single drawing with a caption immediately below or as a speech balloon. Because of the stylistic similarities between comic strips and early, animated movies, "cartoon" came to refer to animation, and this is the sense in which "cartoon" is most commonly used today. These are usually shown on television or in cinemas, and are created by showing illustrated images in rapid succession to give the impression of movement.

Comic strips and cartoons progressively became a respected art form, providing powerful imagery, expression of universal themes, and timely commentary on society. Thus, it is quite natural that the soil appears in comic strips and cartoons. In this chapter, we will review the various representations of the soil in comic strips and cartoons, structured around the soil functions scheme.

27.2 Soil Functions Scheme

From an anthropocentric viewpoint, soil functions can be defined as "the capacity of soil processes and components to provide goods and services that satisfy human needs, directly or indirectly" (after De Groot et al. 2002). A number of authors have identified, or categorised, soil function schemes (De Groot et al. 2002; Blum 1993; Blum 2005; Brady and Weil 1990; CEC 2006; Nikitin 2005; Sombroek and Sims 1995). Despite the use of different terminologies, and to a lesser extent, different emphases and subdivisions, these authors agree largely on the main, or primary, soil functions. Table 27.1 shows a harmonised soil function scheme, including its main components. In the following section, we will investigate how the individual soil

Primary Soil	
Functions	Components
<u>H</u> abitat	Refugium function; nursery function; medicinal resources; gene pool; seed bank
<u>I</u> nformation	Cultural information (archaeological & palaeontological); science and education; spiritual and historic; recreation; aesthetic information
Production	Food; fodder; fibre; raw materials; renewable energy
Engineering	Technical, industrial and socio-economic structures
Regulation	Gas regulation; climate regulation; disturbance resistance; disturbance resilience; water supply; water filtering; pH buffering; biotransformation of organic carbon; soil retention; soil formation; nutrient regulation; biological control; waste and pollution control

Table 27.1Harmonised soil function scheme (HIPER). After De Groot (2002), Blum (1993 and2005), Brady and Weil (2001), CEC (2006), Nikitin (2005), and Sombroek and Sims (1995)

functions are portrayed in comic strips and cartoons, before discussing general themes and relative importance.

27.3 Soil Habitat Function in Comic Strips and Cartoons

A handful of soil under grassland is known to contain up to 100 billion bacteria (10,000 species), 50 kilometers of fungal hyphae (500 species), 100,000 protozoa (hundreds of species), 10,000 nematodes (50 species), 5,000 insects, arachnids, molluscs and worms (hundreds of species), and about 500 metres of plant roots from dozens of species (Ritz et al. 2004). That soil as habitat is often recognised in comic strips; however, only a small part of this remarkable soil biodiversity appears in comic strips. Most of the characters are macrofauna (mainly earthworms), but other animals, partly dependent on soil for their habitat, also appear (*e.g.*, rabbit, mole, badger, ant, platypus). In addition, numerous imaginary creatures populate the soils in comic strips.

27.3.1 "Real World" Habitat Function

Nearly all the "real world" soil animal characters that are featured in comic strips are earthworms. Indeed, earthworms are well known by all of us; they are large enough to be drawn and recognizable, and they benefit from a good image. They even appear in books for children, *e.g.*, "There's a hair in my dirt!: A Worm's Story" (Larson 1999); "Tribulations gastriques d'Eric le lombric" {*"The gastric tribulations of Eric the worm*"} (Dahan 1998).

The adventure element was taken one step further by the creation of, first the video game, and later, the comic strip, "Earthworm Jim" (Perry and TenNapel 1994). Although the main character and action hero is an earthworm, his 'ultrahigh-tech-indestructible-super-space-cyber-suit' (or simply 'super suit') gives him such powers that the storyline provides little soil-related action. Some of the supporting characters appear to be based on soil organisms, but the fantasy element overrides. Earthworm Jim appears to have enjoyed a loyal and enthusiastic cult fan base in the United States.

Other animals, living in burrows, often appear in comic strips. The most frequent one is the mole, who may be described as a sympathetic character, *e.g.*, in "*le vent dans les saules*" (Plessix 1996), or as a pest, *e.g.*, in "*Arnest Ringard et Augraphie*" (Jannin et al. 2006), or as an earthworm predator (Donald Duck weekly – Walt Disney 2003). Another frequently nice character is the badger. In "*le vent dans les saules*" (Plessix 1996), after the book "The Wind in the Willows" from Kenneth Grahame (1908), he organised a burrow visit for his friend the mole. Unexpected animals, such as the platypus in "*Toto l'ornithorinque*" (Chivard and Omond 1999) also appear in children's books, and innumerable rabbits, foxes, and even ants, populate comic strips and cartoons.

Soil microfauna and microflora are sometimes present in comic strips. In "Kaze no tani no Naushika" (Miyazaki 2000), soil fungi and other soil microorganisms constitute the heart of the story. Earthworms may simply appear in gardening activities, e.g. Boule et Bill "un ver ça va" (Roba 2001); Achille Talon "A bout (mal) portant" [Regnier (Greg) 1984]. They can also be bred or even hunted (Fig. 27.1). Such a feature story, called "The Worm King", is told in probably the most-read children comic strip in The Netherlands: the Donald Duck weekly. The story starts with Donald suddenly realising the commercial potential of harvesting and selling earthworms. His nephews are employed to collect the earthworms, but their stamping attracts vast numbers of moles. This leads to the destruction of the office of their business, which they one day find on top of an enormous mole mound-the moral of the story being that too much interference with a natural system will lead to unforeseen problems. Although this story is one of the more advanced examples of the dynamics and management of soil as an ecosystem that we encountered in comic strips, there is a scientific problem in the assumption that stamping will attract moles. Moles (Talpidae) are known to be extremely sensitive to vibrations, which they can sense with mechanosensory organs called "Eimer organs" (Catania 2000), because they locate their prey by the tiny vibrations of their movement through the soil. However, the much stronger vibration caused by stamping people, or indeed humanoid ducks, are more likely to repel moles.

Despite the scientific flaw, or jump in logic, in this story, it remains an enlightened example of soil featured in a mainstream comic strip. It lifts soil from a static entity to a dynamic system—a habitat of multiple species (not just earthworms), showing prey-predator relationships, and highlighting the importance of understanding soil processes for soil management, *i.e.*, to prevent unforeseen negative impacts. Considering the readership of this comic strip, it can be argued that this story also



Fig. 27.1 A technique for hunting earthworms in "La dalle maudite" (Carpentier 1980). "Hey, Raphael, how do you do to catch earthworms ? Oh, it's easy, look...

You hit the soil, and when earthworms emerge from the soil surface to see what's happening, squeak, you catch them..."

Extract from the book "La Dalle Maudite" (The accursed dale), Louis-Michel Carpentier, © Casterman, kindly authorised by the author and the Casterman editions

delivers on the information function (see 27.4). In contrast, Fig. 27.1 describes a completely unrealistic way of hunting earthworms by rats. Earthworms have also inspired authors to more adventurous or fantastic stories, which are the scope of the next section.

27.3.2 Soil Habitat Function for Imaginary Creatures

Soil, as all natural media, provided a source of inspiration for imaginary creatures and worlds. The fact that the soil is still largely unknown by almost everybody certainly enhances its fantasy potential. Thompson (1969) described an island full of monsters, including an earthworm the size of a python (see Fig. 27.2), although it will seem reassuring to a soil scientist that the one soil-borne monster in the story was harmless.

The comics' character Léonard, (Turk and De Groot 1990) built a giant metallic earthworm to explore the soil. Totally imaginary creatures can also live in the soil in comic strips such as "Fungus the Bogeyman" (Briggs 1977). In "Le Fluink – enfin



Fig. 27.2 Example of adventurous comics featuring the soil habitat function (Thompson 1969). Worm as large as python. © DC Thompson & co, Ltd, London

libre" (Barou and Renaut 2006) two parallel and symmetric worlds are living and competing above and below the soil surface.

27.4 Information Function

Most material that primarily concerns the information function of soil can be subdivided into i) archaeology-related stories, *e.g.*, treasure hunting, and ii) comic strips that teach about soil processes or properties. A vast volume of educational comic strips in soil have been produced. The Soil and Water Conservation Society in the United States seems to have been particularly active with publications such as 'Help keep our land beautiful' (1966; Fig. 27.3), and the Environmental Adventures series aimed at 8–11 year old children. The National Soil Resources Institute (NSRI) of England and Wales (2006) developed Soil-Net, an online educational tool for children aged 5–16, which features several soil organisms as characters, *i.e.*, earthworm, ant, mole, badger, snail, lady bird beetle, and millipede (Fig. 27.3). The German Umweltbundesamt (Environment Protection Agency) published "The Adventures of Fridolin the Earthworm" in 2004.



Fig. 27.3 Examples of a comic strip as a tool for soil education. The image on the left is the cover of a 1966 publication of the Soil Conservation Society of America © Soil and Water Conservation Society. The image on the right shows the characters of Soil-Net (NSRI, 2006) © Soil-Net.com, Cranfield University

of the United Kingdom. At the first conference of the Parties of the UNCCD (United Nations Convention to Combat Desertification) a booklet 'Comics to combat desertification' was published to raise awareness. The French geosciences agency BRGM (Bureau de recherches géologiques et minières) in the "*les observateurs de la Terre*" series, explained the nature and properties of soil (Goyallon et al. 1996).

Institutional communications about soil and threats to soils sometimes include striking cartoons on soil degradation. The FAO website for instance, shows a picture of the Earth completely degraded by erosion. In this cartoon, the Earth is drawn as an empty skeleton, the bones of which being meridians and parallels (Garner in FAO website, http://www.fao.org/docrep/T0389E/T0389E00.GIF). In this cartoon, it is not clear if the main message from the author is: "non-adapted cultivation practices are accelerating erosion", or "untolerable rates of erosion lead to irreversible losses of agricultural soils".

Academic publications do not generally use comic strips or cartoons, although Jastrow and Miller (1998) very aptly summarised the soil organic matter stabilization mechanisms with a cartoon of little Pac Men attempting to eat protected soil organic matter. Coyne (1996) used a series of cartoons to illustrate the history of soil microbiology. The power of comic strips to aid in the education of a diverse section of society seems substantial. Contrary to air and water (and above-ground biology), soil is generally perceived as dark and unseen. Comic strips provide a means of visualising the opaque world of soil. Moreover, comic strips are not hindered by issues of scale, *i.e.*, from macro soil fauna to microbial organisms or molecular-scale processes. At the same time, the ability to visualise across spatial scales carries a responsibility, or at least a challenge, to take scale into consideration in the education process—even a young child should be guided to know that a fungal hyphen is not the size of a python.

Comic strips that primarily aim to entertain (*i.e.*, mainstream comic strips), rather than educate, reach a large proportion of the public. When soil is the topic of a mainstream comic strip, as for example in the Donald Duck story (see part 3), awareness of soil is raised with a large part of an age group outside of a school setting. Although more limited in its depth of soil information, this kind of soil information is a valuable aid in raising the profile of soil.

Archaeology-related stories (e.g., treasure hunting), are widely present in comic strips. The most famous treasure hunting character is the rich and miserly Scrooge McDuck. Very often, however, the treasure is not found, and the soil appears just as a hard-to-dig material—a cause of useless efforts. A famous fruitless treasure hunting is narrated in Tintin - "Le Trésor de Rackham le Rouge" ("Red Rackham's Treasure") {1959} [Rémy (Hergé) 2002]. In some cases, the archaeological memory function of soil is highlighted. In "*le vent dans les saules*" (Plessix 1996) an entirely buried village is present in the badger's sett. In "Arnest Ringard et Augraphie" (Jannin et al. 2006) the mole Augraphie discovers gold coins, and uses them to pay the rent for living in the garden soil of Arnest.

27.5 Production Function

That the food we eat was grown in soil is something that all of us should be aware of. However, in most cases, cartoons and comic strips that feature the growing of arable crops do not link this to the soil. Tools for soil tillage are sometimes present, the most common of which is the spade. In "*Le concombre masqué*" (Mandryka 2004), it is the vegetable itself (*i.e.*, a cucumber wearing a mask) who ploughs the soil (Fig. 27.4). In this completely unrealistic story, he then sows gravels, which grow into stones and rocks.

In the few cases where the link between food and soil was made, the soil was treated as a 'black box', *i.e.*, crops grow better in one soil than the other, but the reasons for this remain unclear, sometimes with an almost mystical element to it. Gardening was, by far, the most frequently encountered topic in soil-related comic strips. This is probably explained by the fact that more of us do small-scale gardening than large-scale farming. Of course, all of us eat food produced by, in, or on soil; but being one step removed from the process appears to have resulted in a limited personal association with soil, and, therefore limited coverage in comic strips.

Other components of the soil production function (Table 27.1) such as the extraction of raw materials are more rarely encountered. However, open-pit mining activities are drawn in some stories, showing directly their impact on overlying soil (Tillieux 1962).



Fig. 27.4 Le concombre masqué "L'intégrale des années Pilote " – le jardin zen – (the cucumber with a mask – the zen garden) (Mandryka 2004). © Dargaud (see as color plate following *Index*)

27.6 Engineering Function

The engineering function of soil is probably the most recognisable soil function to most people. Even people growing up in the city will have experienced digging in soil in a garden or park when they were young. There is really no escape from the engineering function since, ultimately, we all live on the soil. The need for soil to provide a sound foundation for our homes and environs is essential, although probably mostly taken for granted—out of mind, and rarely connected to the pen of the cartoonist. And this is understandable, as there is a lack of comical or ironic element in everyday life and everyday soil. In contrast, situations where soil properties and processes are not considered carefully enough, and lead to disaster, are common topics in satirical cartoons. It is simply assumed that the soil will provide a good quality, stable platform for us and our structures. However, when the performance of the soil is not in check with the structures we have placed upon it, the soil is easily blamed, although in nearly all circumstances, faulty human planning was to blame.

The engineering function of soil is also sometimes evoked through soil sealing (e.g., overlying soil with concrete). The most famous examples are the towns that sprang up following the Gold Rush of the American West (e.g., de Bévère (Morris) and Goscinny 1987; Rémy (Hergé) 1993).

27.7 Regulation Function

The regulation function was the least encountered soil function in the investigated comic strips. From an environmental point of view, as well as from a scientific position, the interaction of soil with other ecosystem components is arguably the most important soil function of all. This is apparent from the list of components in Table 1, ranging from climate regulation to waste and pollution control. However, examples of the regulation function of soil featuring in comic strips proved to be few and far between. Two reasons for this may be postulated. First, it may be that the public is aware of the regulation function of soil, but it does not provide for interesting, entertaining, or visually attractive material in comic strips. Alternatively, the awareness of the soil regulation function with the public is low or absent and, therefore, comic strip authors judge there is no interest (or indeed, they are unaware themselves).

For a rare example of the regulation function of soil, we return to the Donald Duck story mentioned previously (see 27.3.1.). To expel the moles who have created a huge mound underneath the office, Donald puts the fire hose in one of the entrances to the mound, hoping to flush the animals out. His nephews (who among us can forget Huey, Dewey, and Louie!) discover that the water does not infiltrate the soil, but that bypass flow causes the water to exit the mound further down, thereby flooding the neighbour's property.

One other example was found in a 1978 edition of the Star Trek Comic "The Planet of No Life". The *Enterprise* visits an inhabited planet where nothing grows because of the radioactivity of the soil. The situation requires a quick solution and Mr. Spock creates a formula of 'life-giver' chemicals within hours. The *Enterprise* crew launches two missiles that hover over a section of the planet. One sprays the 'life-giver' chemicals, before the second missile releases young trees. The trees that land in the treated soil live, while nearby the plants released into untreated soil quickly wither and die.

The story does not explain how the soil got to be radioactive in the first place, but the lightning quick formulation of a chemical substance that manages to overcome the physical phenomenon of radioactivity certainly evidences an extremely confident, high-tech attitude towards remediation of polluted soils. Of course, in a comic strip set so far into the future, such reliance on high-tech solutions to environmental contamination can be expected and excused. In "Nausicaa de la vallée du vent" (Miyazaki 2000), a polluted soil is reclaimed by a more conventional forest plantation.

27.8 Conflicts Between Soil Functions

As seen above, the soil functions are unequally encountered in comic strips. This section examines examples in which conflicts between functions form the heart of the story. A consequence of the diversity of soil functions is that conflicts often occur between these functions, and that the 'soil quality' concept is still in permanent debate (Sojka and Upchurch 1999; Karlen et al. 2003; Letey et al. 2003; Sojka et al. 2003). In comic strips, such as in other arts, these conflicts are mainly reflected in land use clashes of interest. Classical examples come from the history of the American West (*e.g.*, extension of the railway, cattle ranchers vs. "sodbusters"). Other numerous examples of conflicts of interest relate to gardening vs. animal habitat (*e.g.*, hunting the moles), or gardening vs. animal activity. A large number of figures of the comic strip "Boule et Bill" (Roba 2001) illustrate the fight between a gardener and his dog who digs holes in the soil to bury all the bones that he gets.

27.9 Soil Inventory and Monitoring

As conflicts between soil functions must be solved, and as soil is a natural resource of common interest that is under increasing environmental pressure (CEC 2006), it is essential that soil inventory and monitoring are undertaken, in order to manage this resource properly. Soil inventory and monitoring are quite esoteric subjects, and as such, are almost never encountered in comic strips. Sometimes, however, a character may give the impression of taking the soil into consideration, or at least feeling curious about it. The "cucumber wearing a mask" (Fig. 27.5) behaves like a field soil surveyor testing the soil; he looks carefully to the soil surface, and even uses an unexpected sense (hearing) to examine the soil.



Fig. 27.5 Le concombre masqué "L'intégrale des années Pilote " (the cucumber with a mask, whole pilot years comics) (Mandryka 2004). © Dargaud (see as color plate following *Index*)

From the soil scientist community (newsletters, websites, educational books), comics strips illustrating soil surveyors doing fieldwork are far more numerous. Digging the soil is a very frequent activity in such comic strips and cartoons.

27.10 Discussion and Conclusions

Comic strips aimed at providing educational material are probably the most common type surveyed here. However, by their nature, such comic strips are small-scale initiatives and therefore, not part of the mainstream world of comic strips. They are designed for a local purpose, *e.g.*, to aid student understanding a university course dealing with soil organic matter dynamics However, with the rise of the Internet, this seems to be a growing area with several initiatives by government agencies and research institutes as part of their public education outreach to help raise awareness of soil as an ecosystem component and a fragile resource.

In the more mainstream comic strips, aspects of the production, habitat and engineering functions of soil appear to receive most attention, whereas the regulation function seems to be underrepresented. An obvious explanation for this pattern is that digging and building (engineering function), farming and gardening (production functions), and our fascination with earthworms and other "creepy crawlies" (habitat function), are simply the most visible and recognisable ways in which we, as children and adults, interact with soil. The components of the regulation function of soil (see Table 27.1) are much less easy to understand or to visualise. Although our involvement with soil in the regulation function is actually substantial and important (*e.g.*, supply of water to vegetation, interactions with climate change by oxidation of soil organic matter, or the filtering of water to make it potable), it is in a more indirect fashion than with the other soil functions. For example, our drinking water comes out of the tap or a bottle—without focused thought, most of us see no association with soil. But almost every day we walk past a building site, or we grow plants in our garden or on our window sill. And somewhat less often, depending on where we live, we see earthworms crawling onto the pavement after it has rained. The regulation function may simply be too far removed from the foreground of our conscious lives to meet the interest threshold of mainstream comic strips.

Compared to the other two main natural media on the planet (*i.e.*, water and air) soil appears to receive relatively little attention in comic strips. This can be illustrated by an exercise on the cartoon bank of *The New Yorker* magazine. All 70,363 cartoons appearing in *The New Yorker* from 1925 to 2007, were searched by topic for 'soil'. Only six were found (0.01%). By comparison, the entry 'water' returned 314 hits (0.45%), and 'air' 171 hits (0.24%). While *The New Yorker* is clearly not where one typically goes to assess environmental attitudes and developments, the relative position of soils is perhaps reinforcing of our view of its low attention level in the general culture.

For educational comic strips, however, the regulation function, with all its complex interwoven soil biological, chemical and physical processes, may be a fertile source of inspiration. Soil biology forms the most obvious source of characters for comic strips, and not only the ubiquitous earthworm. One only needs to look at electron microscope images of springtails (*Collembola*) or mites (*Acarina*) to realise the potential for monstrous characters.

Acknowledgements Thanks are due to Professor Karl Ritz, Dr. Steve Hallett, Andre Gailani from Punch Limited, and Arnoud Klaren for providing material.

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Soil in comic strips and cartoons.

In : Landa E.R., Feller Christian, Descola P. (préf.). Soil and culture.

Dordrecht : Springer, 2010, p. 439-452.

ISBN 978-90-481-2959-1