

## Survey of 218 organic contaminants in groundwater derived from the world's largest untreated wastewater irrigation system: Mezquital Valley, Mexico

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The Mezquital Valley system is the world's oldest and largest example with regard to use of untreated wastewater for agricultural irrigation. Because of the artificial high recharge associated with the Mezquital Valley aquifers, groundwater is extracted for human consumption, and there are plans to use this groundwater as a water resource for Mexico City. Thus, this study analyzed 218 organic micro-contaminants in wastewater, springs, and groundwater from Mezquital Valley. Five volatile organic compounds (VOCs) and nine semi-volatile organic compounds (SVOCs) were detected in the wastewater used for irrigation. Only two SVOCs [bis-2-(ethylhexyl) phthalate and dibutyl phthalate] were detected in all the wastewater canals and groundwater sources, whereas no VOCs were detected in groundwater and springs. Of the 118 pharmaceutically active compounds (PhACs) and 7 reproductive hormones measured, 65 PhACs and 3 hormones were detected in the wastewater. Of these, metformin, caffeine, and acetaminophen account for almost sixty percent of the total PhACs in wastewater. Nevertheless, 23 PhACs were detected in groundwater sources, where the majority of these compounds have low detection frequencies. The PhACs sulfamethoxazole, N,N-diethyl-meta-toluamide, carbamazepine, and benzoylecgonine (primary cocaine metabolite) were frequently detected in groundwater, suggesting that although the soils act as a filter adsorbing and degrading the majority of the organic pollutant content in wastewater, these PhACs still reach the aquifer. Therefore, the presence of these PhACs, together with the high levels of the endocrine disruptor bis-2-(ethylhexyl) phthalate, indicate that water sources derived from the recharge of the studied aquifers may pose a risk to consumer health. © 2018 The Authors SciVal Topic Prominence

Topic: [drug](#) | [Drug products](#) | [products PPCPs](#)

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### Author keywords

Endocrine disruptors; Mexico; Mezquital Valley; Organic contaminants; Pharmaceutically active compounds; Water resources

### Indexed keywords

Engineering controlled terms:	Aquifers; Endocrinology; Esters; Groundwater pollution; Groundwater resources; Health risks; Hormones; Hydrogeology; Irrigation; Landforms; Organic pollutants; Volatile organic compounds; Water resources
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Engineering uncontrolled terms	Endocrine disruptor; México; Mezquital Valley; Organic contaminant; Pharmaceutically active compounds
Engineering main heading:	Recharging (underground waters)

Chemicals and CAS Registry Numbers:

atenolol, 29122-68-7, 93379-54-5; benzoylecgonine, 519-09-5; caffeine, 58-08-2; carbamazepine, 298-46-4, 8047-84-5; clarithromycin, 81103-11-9; cotinine, 486-56-6; diethyltoluamide, 134-62-3, 26545-51-7; enalapril, 75847-73-3; erythromycin, 114-07-8, 70536-18-4; gemfibrozil, 25812-30-0; lincomycin, 154-21-2, 7179-49-9, 859-18-7; meprobamate, 57-53-4; metformin, 1115-70-4, 657-24-9; methylprednisolone, 6923-42-8, 83-43-2; metoprolol, 37350-58-6; naproxen, 22204-53-1, 26159-34-2; paracetamol, 103-90-2; phthalic acid dibutyl ester, 84-74-2; sulfamethoxazole, 723-46-6; triclocarban, 101-20-2; trimethoprim, 738-70-5; valsartan, 137862-53-4; phthalic acid bis(2 ethylhexyl) ester, 117-81-7;

Dibutyl Phthalate; Diethylhexyl Phthalate; Endocrine Disruptors; Pharmaceutical Preparations; Soil; Volatile Organic Compounds; Waste Water; Water Pollutants, Chemical

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